

MOTOR AGE

VOL. XXIII

CHICAGO, FEBRUARY 27, 1913

NO. 9



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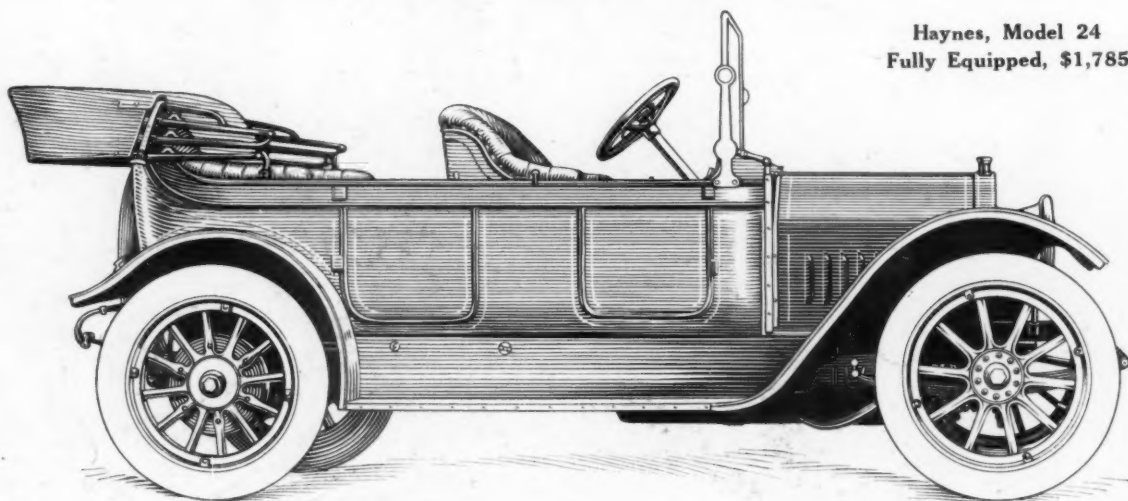
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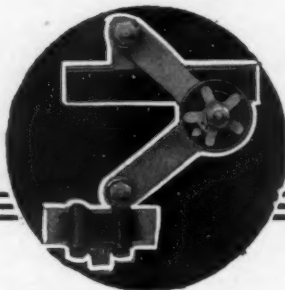
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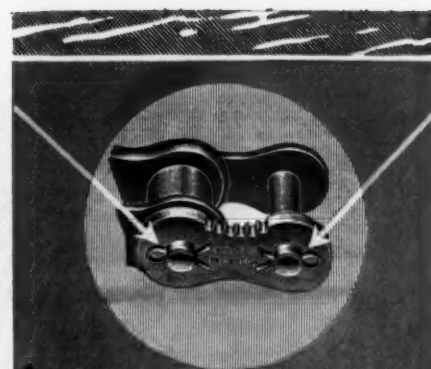
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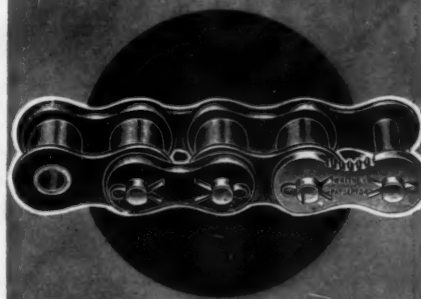
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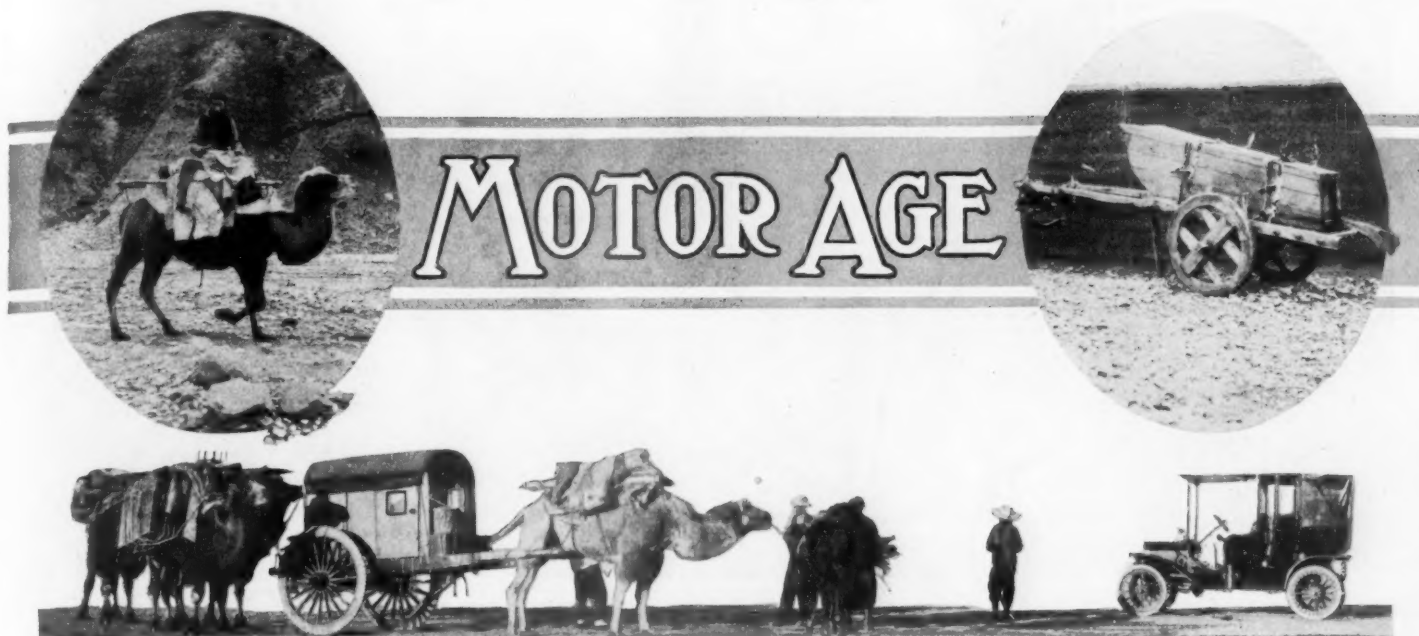
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The illustration in the upper left-hand corner shows the camel which is the motor car of the desert. In the upper right-hand corner is a Chinese cart loaded with a coffin, while the third illustration shows the old method of transportation and the new, a chance meeting that took place in the Gobi desert. It affords a rare opportunity for a comparison of the old and new methods of transportation.

Motorizing the Buddha of Urga

By Ethan C. Le Munyon
Part I

TO cross the Gobi desert in a motor car and bring into juxtaposition with the remnants of an ancient empire, with its cities buried and almost forgotten, the latest transportation methods of modern civilization, is to give a zest to this mode of travel which in other parts of the world has become commonplace.

To add to this the novelty of delivering to the Buddha of Urga a motor car which had to be driven under its own power through a territory into which such a vehicle never before had ventured, makes of such a trip an adventure such as few motorists ever have encountered. It sounds like a dream—almost a nightmare—yet it fell to the lot of the writer.

Romances of the Isthmus

In the Great American desert still remains the mute records of a by-gone race in the long-vacant homes of the cliff dwellers; buried beneath the shifting sands of the Gobi desert in Mongolia are cities built when the Mongol reigned supreme in Asia and nearly all of Europe. From these mountainous plains of northeastern Asia arose a conquering race. Its primal spirit was Ghengis Khan and under his leadership the nomadic tribes of those countries north of China proper, that is, Mongolia, Manchuria, etc., swept across Asia and invaded Europe.

Tatar was the original name of these fierce warriors but the European monks in recording their conquests and devastations, corrupted it into Tartar, this

form being suggested by its similarity to Tartarus, meaning hell, the acts of the Mongols in their conquering invasions being so atrocious as to brand them with Satanic attributes. In India, which came under their subjugation, these same Tartars, or Mongols, were called Moguls. The Huns and Vandals are traced to this common source. Their empire was the greatest in area of any ever known. Although in barbaric fashion these Mongols, bringing under their dominion all the countries from the Yellow sea to the Black sea, and still westward almost to the Baltic, overrunning Russia and holding sway from the steppes of Mongolia to the Indian ocean, conquered with brutality, yet they gave some worthy characteristics to the civilization of the countries dominated.

It was against their encroachment that the Great Wall of China was built and

against them the Chinese struggled for centuries in vain. But Mongolia now pays tribute to China, and the Great Wall, for stretches, has disappeared, while in other parts it remains only as an earthen rampart, considerably less in height than where it still may be seen in perfect condition near Peking, with an average height of 26 feet and a width of 20 feet. To see this prodigious line of earth and masonry rising and falling in serpentine grace with the undulation of the ground is to start a chain of thought as long and strange as the Great Wall and, with it, reaching back hundreds of years, bringing strange conjurations of the people who raised it.

Selling Car to the Buddha

The China American Trading Co., Inc., at Teintsin, through F. A. Larsen of Kalgan, China, obtained an order for a motor car of a closed type, for the Living God or Buddha of Urga. This order may have been an outcome of the ride the governor-general of Mongolia enjoyed in the Italia motor car that made the Peking to Paris trip in 1907, at which the Living God was somewhat piqued because the governor-general had superseded him in the matter and secured the first ride in the chi-cho or fuel chariot. This Living God, or Grand Llama of Urga, is one of his three representatives on earth in whom Buddha's soul is supposed to live. First

in rank, or the highest representative of Buddha on earth is the Dalai Llama of Lhasa, the second, the Grand Llama of

EDITOR'S NOTE—This story of the adventurous trip of an American who sold a car and delivered it to the Buddha of Urga in the wilds of the Gobi desert was compiled from the diary of Ethan C. Le Munyon of the Leather Tire Goods Co. of Niagara Falls, N. Y., who had charge of the expedition. The second installment will be published in Motor Age March 5.



Caravan on its way through the Gobi desert



American expedition en route up the Pass, which is a hard climb

Urga, while the third is located at Peking.

Be that as it may, the order was given, and in deciding upon the car to be furnished it was essential that the make and type to be selected be adapted to the country in which it was to run. The subject of maintenance had to be considered, since the car was to be operated by people totally ignorant of the simplest principles regarding motor cars, and hence must be as near foolproof as possible. The car finally decided upon as being best adapted to the circumstances and conditions was an American Ford townear.

Delivery a Problem

The next problem was how to deliver it. It was too large to ship either by bullock or camel cart, the only two ways by which heavy merchandise can be shipped across Mongolia. The inadequacy of such modes of travel may well be seen by the accompanying illustrations. Therefore, the only

possible way to deliver the car in Urga would be to drive it under its own power from the end of the railway at Kalgan, through the famous Kalgan pass and across the Gobi desert to Urga, about 800 miles northwest of Peking. It was something to not have to drive the car from Peking to Kalgan.

Upon its arrival at Tientsin about the middle of September, the car was immediately set up and placed in working order, and driven for 3 or 4 days to thoroughly test all working parts before shipping it to the end of the railway at Kalgan. Shipment was made from Tientsin by flat car on September 20, and the writer, who was to drive, or deliver the motor car by any other method, into Urga, left the same afternoon for Peking, where it was necessary to stay over night, and to take another train on the Peking-Kalgan line the following morning. Kalgan was

reached the afternoon of the 21st, and as the car did not arrive until the succeeding day, the writer spent the night with Charles Heininger of the American Board Mission. There were only four English-speaking foreigners in Kalgan including Mr. Heininger. The other three were Americans employed by the British American Cigarette Co.

Location of Kalgan

Kalgan, a city of from 50,000 to 70,000 population, is situated about 125 miles northwest of Peking, and is at the present time the terminus of the Peking-Kalgan railway. It is one of the most interesting and picturesque cities of China. Located at the bottom, or mouth, of the Kalgan pass, it has an altitude of 2,800 feet. Among the Chinese the city is spoken of by its true name of Chang Che Ko, only the foreigners and Mongols using the name Kalgan, which, in Mongolian means barrier. This is the gateway through which trade between China and Mongolia and Siberia is carried on; the Chinese, who control this trade, sending out through this gate brick tea, the cheapest grade cloth, tobacco and small manufactured articles, and bringing in from the northern countries wool, skins, furs and horses.

The start was made from Kalgan on the afternoon of September 22. The streets were so crowded with curious Chinese eager to see a motor car, that it was almost impossible to pass along without running over dozens of them. Mr. Heininger rode ahead on his horse and, in company with a Mongol horseman, accompanied us and helped clear the street ahead of the car. We stopped and purchased a native shovel and two boards each about 8 feet long so that in case we became stuck in the mud we would be enabled to get out, and with the boards bridge over some of the large holes, as well as help the machine over some of the large rocks imbedded in the middle of the road or, as



Starting up the Pass. The bullocks were used on a steep hill called "Han'Or," so, as we had to pay the same price for them whether we used them or not, we used them in this case to save gasoline

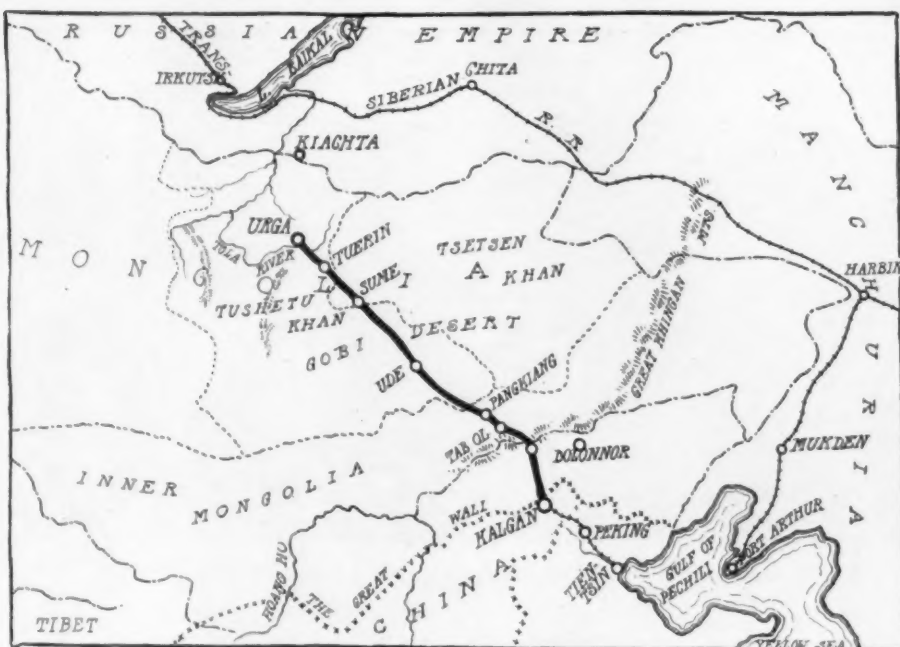
we might say, beaten track called a road.

Kalgan is a walled city, the Great Wall of China forming its northern barricade and in passing through the north gate of the city we found ourselves outside the Great Wall as well. However, at the present day a great many houses and shops are located outside of the city wall, since its purpose has ceased to exist though the wall still stands. Immediately after passing through the gate it was necessary to ford the river which, fortunately, was not deep at this time. We inquired for the road and were told to follow the river bed as there was no other road. One can fancy the sort of road to be found in such a place, especially when it is known that these streams, very small at other times, after heavy rains are swollen and sweep down their valleys with such violence that caravans caught in them at such times are helpless and the dead often are carried down even to Kalgan.

Difficulties Encountered

The river bed is, of course, filled with loose gravel and large stones. Several small streams flowing through made it necessary to ford them continually so that we were in water and wet gravel a good share of the time. The grade was very steep, making all low-gear work. The Woodworth treads on the tires were a decided advantage as they helped the rear wheels to get traction and prevented cuts and tears in the tire casings. About 6 o'clock it began to rain so we drove into an inn yard where we intended to remain the night, having traveled 6 miles the first afternoon.

Our party consisted of an American trained nurse on her way to visit some friends at Tab Ol, a missionary whose destination was Urga, and the writer. The missionary served as interpreter, being familiar with the Mongolian language, and



Map of route followed by American expedition

he expected to teach some of the natives in Urga how to run the car. In preparation for this undertaking he had spent a week in Teintsin learning, or trying to learn, to drive similar cars. The car was utilized by the nurse as a sleeping apartment, while the missionary and the writer fortunately obtained the exclusive use of a sort of shed, with its mud roof half gone, but provided with a brick kong—Chinese brick bed. Hot water was obtained from the inn-keeper and we prepared our supper from the stores we carried with us.

The rain continued during the night and until 10 o'clock the following morning. We hired some coolies with five oxen to help us over the difficult places in the river bed and until we should reach the top of Han Or hill at the end of the

pass. Due to the rain the river bed now contained about four times as much water as it did the night before. We drove out of the inn yard under our own power, and sank almost to the hubs in the soft, slippery mud. We took no chances, however, on getting stuck, and attached the animals at once and hit the trail. It still was raining a little, the grade was heavy and the earth very soft and full of loose stones—ranging from the size of a baseball to those weighing several hundred pounds. We threaded our way amongst these as best we could.

Passing Camel Caravans

Camel caravans were passed from time to time. In one of the illustrations is shown the method of leading the camels. They usually are grouped in strings of



Mongolian mutton, the source of most of the carpets made in the New England states. The mutton is consumed by the Chinese of Peking in this special case and not made into carpets



The Temple to the Horse, half way up the Han'Or hill at the end of Kalgan Pass



The writer getting a drink from a deep well, which was about 70 feet deep. It was a dug well and the water was cold, which advantage was offset because the bucket was of untanned, raw cow hide, with hair still on. The hair was on the inside of the bucket, too. For each mouthful of water one drank he also had a quarter mouthful of hair



Climbing a steep hill. Note the loose rocks and rubble in the road which was deep with soft mud so that it was difficult to obtain traction for the wheels

five or seven, the leader being the bell camel, the others, each having a stick through the nose, one end of the leading rope tied to this stick while the other end is fastened to the trappings of the camel ahead. Almost without exception the camels which we met were traveling light, bound for Kalgan for a cargo of tea and other goods to be carried up country.

Most of the overland shipping begins at this time of the year, the early fall, and continues during the winter months, ending again in the spring. During the winter the earth is more moist and the winds cannot pick up the dust as when it is parched and dry, and, therefore, sand storms are less frequent in the winter season. The winds are at times so terrific that caravans are delayed because the

camels cannot make headway against them. The soil is of a light nature and crumbles with the least pressure, so that travel readily turns it to dust which is at once carried away by the almost constant wind.

As we have seen, the Chinese use the beds of rivers for highways instead of building roads. In such places the ruts made by the cart wheels are filled by the action of the water, but where the roads do not follow stream courses, the cart wheels wear deeper and deeper into the light soil which is constantly being blown away by the wind until the roadbed is worn many feet below the surface.

Chinese Cave Dwellings

About noon the sky cleared. We passed a Chinese village built of combined houses and cave houses. The illustrations show how very primitive these dwellings are. The pass was much wider here and small fields were seen on the sides of the hills where they had been terraced and made level so that small quantities of grain and other food stuffs could be raised. The people were very poor and everything denoted an extremely meager existence. There were several inns at this place, but they also were very poor. Occasionally we passed flocks of sheep bound for market from the pasture lands of Mongolia. Instead of being branded, on the backs of the sheep marks were painted in red, symbols by which each owner could tell his own stock.

Eventually we reached the bottom of Han Or hill, the ascent of which was not pleasing to contemplate. The road was a sea of mud with large, sharp boulders for islands. After eating lunch and giving the animals a rest, we took a picture of the car at the foot of the grade. We also photographed two Chinese carts on each of which was a Chinese coffin. These carts are the common type of bullock cart and are constructed almost entirely without the use of metal, wooden pegs being used in place of bolts and nails. The wheels are of wood with no tires of any kind. It is surprising how much these carts will stand before breaking.

Grades Hard to Climb

It was necessary to use the entire power of the car as well as that of the five bullocks to get up some of the grades, slippery with mud and full of loose stones, while embedded in the road were a great many boulders. These it was necessary to dodge or risk smashing a wheel. Sometimes we would have to go around them as they were too large to pass under the axles. Because of this, and the sidling nature of the road, it was necessary to tie a rope over the roof of the car and station a man on each side to prevent its upsetting and rolling down into the canyon below.

At the Temple of the Horse, which is part way up Han Or hill, is a resting place. The view from the temple is fine, but as we looked back down the pass toward Kalgan we wondered how it had been possible for us to have come so

far without accidents. On the hills to the right could be seen two of the watch towers built when the great wall was constructed, over 2,000 years ago. Needless to say, the deeds recorded in many pages of Chinese history were enacted in this pass, where numerous battles have been fought. The Temple of the Horse, or rather, the Temple to the Horse, is constructed entirely of stone and is a picturesque structure. All Mongols and Chinese are supposed to stop here and leave an offering, and nearly all do. The superstitions of these Asiatics keep them continually making votive offerings to propitiate the gods.

Sharp Stones Terrorize Motorists

After leaving the temple, the road becomes steeper, and worse and worse as regards sharp stones. There were places where we had to build a track for the wheels. This we did by laying flat stones over the holes and breaking off sharp points of others by dropping heavy stones on them. The writer wore the skin off his hands handling these stones and building roads. After seeing two bullocks and two Mongolian horses hitched to an empty bullock cart, pulling as hard as they could to get it up the hill, one began to realize how steep the hill actually is. But we conquered.

The wheels had been in mud and water the greater part of 2 days and the leather was very soft. With the exception of two of the strap rivets pulling loose, we experienced no difficulty. The worst roads of all were encountered near the top of the hill where the ruts were deep, full of mud and water, with high centers between them.

Being close to the top of the hill there was little of river washings to fill the ruts. Here it frequently was necessary to use the native shovel which we had purchased before leaving Kalgan. Sometimes the missionary had to go ahead to test the depth of the mud holes and find the bottom before we could venture with the car. In other places he had to stand on the running board to keep the car from upsetting, where the road was very uneven. The strain and racking were severe and we all felt the effects.

Second Day of Journey

We arrived at the inn about 6 o'clock. On this, the second day of our journey, we had traveled for 7 hours and had gone 10 miles, but the ascent in the 17 miles traversed from Kalgan was very steep, taking the traveler from the warm fertile plains of China to the harsher climate and sterile soil of the Mongolian plateau. Because of the heavy grades a Chinese cart had been hired to take excess baggage to the top of the pass. Looking down from this table land, the Kalgan mountains of a reddish hue, seamed by countless valleys that looked mere crevices, swept in undulations toward the great Khin-ghan mountains to the east. The road we had come by winds up the valley of the Shin-shan-ho, following the riverbed, which is dry



The Mongolia Temple of the Horse. Note the long tails of the ponies



Paying and discharging the Chinese carter who brought our surplus baggage up over the worst part of the muddy country. At this point the roads were hard and all the baggage was placed in the car. Payment was made by lump silver which had to be weighed out by Mr. Almblad. The woman is a Miss Crowder, an American trained nurse, who was calling on a friend who resided 90 miles from Kalgan in Mongolia. She traveled with us for 3 days



Leaving the North Gate Kalgan, entering the riverbed which serves as a road to the pass

except after heavy rains. The overcast sky of the morning had made us anxious lest we be caught in the pass by a storm.

After bargaining with the keeper of the inn, we ran the car into the yard, or compound as it is called, through mud from 4 to 8 inches deep. We were supposed to occupy the common inn room, the dimensions of which were about 15 feet by 20

feet, and 7 feet high, with about thirty Mongols and Chinese, but we objected so strenuously the inn keeper said we could stay in the room that he was then using for a granary. We moved the pile of saddlebags, bundles of onions and garlic to one side of the room and spread our canvas ground cloth on the ruined brick kong, which had a hole in the center



Looking backwards down the Kalgan pass—The large watchtowers are about 100 feet square and are the former outposts of the Great Wall of China, which also forms the north wall of the city of Kalgan. This point is about 20 miles outside of Kalgan. We are now almost out of China and into Mongolia

about the size of a washtub. Here we passed the night listening to the infernal jabbering of the Chinese and Mongols. The nurse was rather fortunate in having the car to stay in, even if it was rather small and cramped.

While the bill at the first inn had been only 540 cash—25 cents gold—for lodging for three foreigners, hot water for tea, food for our Mongol boy and his horse, the bill at the present inn was slightly more because we had demanded better accommodations and had had a private room. The price charged a Chinaman for a night's lodging is 2 copper cents—1 cent gold—but foreigners always have to pay about ten times as much. It is like the tourist problem the world over, quite legitimate.

Waiting for the Carter

The start on Sunday, September 24, was not made until noon, as we had sent our first Chinese carter back to Kalgan, having hired him to come only to this point, and we had to wait for a second carter to come to carry our goods to Haraossu—black water—where it was reported we would find the roads in much better condition. This was the point to which the Pekin-to-Paris motorists were drawn by horses and where they again used their own power. We were told by the natives they had been drawn from Kalgan to this point, while we with our outfit had come almost all the way under our own power.

On this day we passed through the country of the Chinese cultivated fields, encountered a great deal of mud and very rutty roads as well. After fording many little streams we arrived at the small Chinese village, for we had not yet reached the border of Mongolia. This village is known as Meeota—meaning temple village—being so called one might ironically suppose because of the lack of a temple, or only a small one being here.

The night was again spent in an inn, which was slightly better than the pre-

ceding one. This was the last Chinese settlement, for we were soon to enter Mongolia. There was a great pile of sheep and camel wool in the inn yard awaiting



Chinese graves—The hole is to let the spirit have free access to the outer world so that the spirit can occasionally see if proper respect is paid to the departed's body by the relatives

shipment. When we left, the women of the place lined up in front of the inn gate to bid us good-bye.

Mongolia with its great desert lay before us, although we were not to enter the Gobi proper for some time. The topography of the country was now a flat plain, with slightly rolling hills showing dimly against the horizon. While there are great stretches of level sandy plain, yet the Gobi desert has much broken surface. The alkali soil is of a reddish gravel or sand, mixed with stones—quartz and pebbles, even agates, carnelians and chalcedony, whose colorings furnish a welcome relief to the interminable wastes of sands. Vegetation is practically nil, with the exception of a few grasses such as are common to our own alkali country in the southwestern states. These grasses, however, sometimes grow to a height of 4 or 5 feet. On account of the lack of vegetation argol—dried camel and cattle dung—is the sole fuel used by the natives.

Water Is Scarce

Water is scarce, a few miles along the caravan route furnishing the entire supply. In the winter blocks of ice are carried for this purpose, at other seasons two large tubs filled with water, one on each side of a camel. During the winter and spring the camel is the only animal that can travel across the desert and subsist on the dried and scanty grasses.

September is an ideal month in which to make a trip across the Gobi desert, as at that time there is very little wind and the dust storms have not begun, but extremes of temperature are experienced even at this season, for while the nights are very cold the days become very hot.

Mongolia, besides desert lands, also has high, cool, grassy lands, where camels, herds and flocks thrive. But the desert



The last Chinese village, "Mee'ota" or, literally, "Temple town." Only a small temple here. Note the bound feet of the women

alone covers an area of 300,000 square miles, and the Great Wall was built for 1,550 miles along this Mongolian plateau, forming the northern boundary of China, and served as a barrier against the northern barbarians for 1,400 years. It is doubtful whether any of the original structure remains. Sections of it have been rebuilt at different periods, that between Ordos and the Yellow sea in the fifth century, and restorations being twice made in the fifteenth and sixteenth centuries to the ramparts northwest of Peking. There are three principal gates—the Kaiyn-kuan or jade gate, the Yuamin-kuan and the Shang-hai-kuan. The jade gate derived its name from the fact that through this gateway passed great quantities of the precious stone brought from the Khotan country. Yuamin-kuan, "gate of the south," is the gate at Nankow pass, while Shang-hai-kuan is that nearest the sea.

If one of their own pictured dragons had suddenly appeared among them full of life, it scarcely could have had greater power to frighten all things along its path than did our motor car. A drove of black pigs, which we tried to pass, broke away from the driver and, squealing, followed the car for a mile or more, the driver, or herder, as he hurried after his charges, calling to us about the kind of ancestors we were supposed to have.

A Road Incident

A foot traveler was asleep in the middle of the trail. We drove almost up to him and tooted the horn. He must have thought his day had come. He was so scared his eyes looked like saucers, and he could hardly get out of the road he was so paralyzed with fear. It is said that the orientals, and especially



The traffic of all Mongolia flows through this pass. The camel is the common carrier and the Overland Limited of the plateau of Central Asia. They are tractable beasts, and we passed many of these caravans while en route across the desert. We found it most interesting studying the habits of the camels and their drivers

the Chinese, never change their expression. This one did.

A couple of Chinese graves were passed, curious looking piles of stone, each with



The Ship of the Desert. All Mongolian camels are true camels and have two humps. Several times we enjoyed the pleasure of a ride on one of these beasts

a hole in the end of the grave, so the spirit could readily pass in and out and keep watch over the body from which it had

departed and see that proper respect is paid it by the relatives of the departed one. This is only one of the many, to us, strange ideas and superstitions these simple people hold regarding the movements of spirits.

A few bullock carts with their primitive wheels were passed on the way to market with their loads of sun-dried cow hides. Once we stopped and conversed with a group of Chinese, who never before had seen a motor car. Later in the day we passed a large flock of goats grazing beside the trail—yes, trail, for we were following the camel route across the desert, and not the cart road which lay to the southwest of us. We also passed a group of Mongols who were very curious about the car, and as to where we kept the fire that made it go. We photographed them in a group beside the car.

Fording Difficult

About noon we tried to ford a stream, got into soft mud in the middle, and stopped. The stream was about 50 feet wide. It proved a wise forethought when the writer provided the car with a set of small iron block and tackle and a long iron rod. The blocks were now threaded up and thrown ashore with the iron rod and heavy hammer. The rod was driven in the hard ground a short distance from the water and the writer, who was still on the radiator of the car, fastened the other end to the axle.

We gave some copper coins to a couple of Chinese who came along at this time, to tie ropes around the rear wheels and to shovel away the accumulated mud in front of the wheels. We had kept the motor going as we had not dared to stop it. The water was over the muffler and up to the engine bed, almost into the carbureter. If we had permitted the engine to stop it would have been impossible to start it again, and we needed it badly about this time.

(To be Continued)



Chinese semi-house cave-dwellings, in the pass above Kalgay, are shown in the background of the illustration

Rubber Workers' Strike at Akron Broken

Critical Situation Relieved Tuesday When Nearly 2,000 Employees of Tire Companies Return to Various Plants—Goodyear Announces Intention to Erect New Building 1,000 Feet Long and Ten Stories High Now Trouble Is Over

AKRON, Ohio, Feb. 25.—Special telegram.—The backbone of the rubber workers' strike here, started by the I. W. W., which has been on 2 weeks, broke today when nearly 2,000 of the workers returned to work. The I. W. W. leaders were no longer able to hold the men. As a result of the stampede on the part of the men to get back to work, all of the factories will be in full running order in 2 or 3 days. Indications at this time are that every rubber plant here will be running night and day within 2 days. It is claimed that the I. W. W. strike agitators will now move on to Patterson, N. J.

The rush of men at the Goodrich, Diamond, Firestone and Goodyear plants was so great today that it was impossible to place them. At the Firestone plant, where the strike started, H. S. Firestone, president of the company, said: "The men are coming back faster than we can adjust our departments to care for them."

Announcement was made today that the Goodyear Tire and Rubber Co., now that the strike is over, will start work at once on the largest building in the country for rubber manufacturing purposes. It will be over 1,000 feet long and five stories high. It will be built on the site of the present group of Goodyear buildings and will employ 2,000 additional men.

Ready to Take Testimony Both Stromberg and Zenith Prepare for Carburetor Suits

DETROIT, Mich., Feb. 22.—An interesting point in the patent litigation between the Stromberg Motor Devices Co., Chicago, and the Zenith Carburetor Co., Detroit, the former alleging infringement of its Ahara and Richard patents by the latter, which has recently filed a counter suit against the Stromberg concern for alleged infringement of the Bavary patent, has arisen from the fact that the Zenith counter suit practically is the first patent suit to be brought under the new rules of practice in the federal court, which went into effect February 1, and which call for much simpler phrasing of bills of complaint than was customary under the old rules.

Both the Zenith and the Stromberg suits are now about ready for the taking of testimony, which will be proceeded with just as rapidly as possible, according to V. R. Heftler, president of the Zenith company. Apparently the last obstacle to prompt progress was removed last week, when Judge Tuttle, in the federal court in this city, after commenting upon the desirable changes accruing from the new rules of procedure, overruled certain formal objections which had been raised by the Stromberg company's attorneys to the Zenith bill of complaint charging the former with infringement of the Bavary patent. Mr. Heftler states that the bill of complaint sought to conform with the new rules, and was a genuine attempt to get away from the lengthy, labored and verbose phraseology which has in the past made patent procedure so difficult for a layman to understand.

The following quotation from Judge Tuttle's opinion will serve to show how little sympathy technical and formal objections will receive, now that the supreme court has authoritatively spoken for simpler statements:

As is well known, no part of a bill of complaint for infringement of a patent, in the form that has become settled under the old equity rules, was more verbose and reiterative than the several opening paragraphs of a bill thus drafted, and it strikes me, that counsel for the complainant, in adopting the language found in the opening paragraph of its bill, has conformed in a most gratifying degree to the language and intent of the new rules in simplifying and abbreviating his bill of complaint. The motion to dismiss is therefore denied, and that part of new rule 29 calling for the filing of the answer within 5 days after the denial of such a motion as this, must be observed.

INTERNATIONAL MOTORS ELECTION

New York, Feb. 26.—Special telegram.—At the annual meeting of the International Motor Co., New York, held last week, the following directors were elected: Edmund C. Converse, chairman; T. L. Chadbourne, Jr., C. P. Coleman, William E. Corey, Otis H. Cutler, Harry W. Davis, Herbert H. Dean, William C. Dickerman, Frederick H. Eaton, W. T. Graham, Arthur H. Lockett, Hunter Marston, Ambrose Monell, Thomas E. Rush, Charles H. Sabin, W. D. Sargent, Warren A. Wilbur. The officers elected are: C. Phillip Coleman, president; William C. Dickerman, chairman of the executive committee; E. C. Converse, chairman of the board of directors; F. C. Richardson, treasurer; Vernon Munroe, secretary.

An eight-story service building affording 200,000 square feet of floor space and costing \$1,000,000 is now being completed for the International Motor Co. at West End avenue and Sixty-Fourth street, New York city. This building will be used for service extended to Macks, Saurers and Hewitts.

HUDSON IN ROAD FUND

Detroit, Mich., Feb. 25.—The Hudson Motor Car Co. has agreed to donate \$100,000 for the construction of the transcontinental stone road, the conditions being the same as in the case of the Packard and Willys donations.

Cross Holly Sales Manager

Detroit, Mich., Feb. 24.—The Holly Bros. Co., carburetor maker, announces the appointment of C. W. Cross as sales manager. Mr. Cross formerly was with the General Motors Truck Co.

New Car Concern Formed Monarch Motor Car Co. Enters Detroit Manufacturing Field

DETROIT, Mich., Feb. 25.—The latest addition to Detroit's growing list of motor car manufacturers is the Monarch Motor Car Co., the articles of incorporation of which were filed with the secretary of state Saturday. L. G. Hupp, who until recently was secretary and treasurer of the R. C. H. Corp., is president of the new concern. The other officers are understood to be well known business men of this city but announcement of the complete personnel of the organization is not yet made public.

Mr. Hupp stated last night that a complete announcement of plans of the company would be made on March 1, and that the temporary quarters are located on Scotten avenue in a plant formerly occupied by the Acme Electric Co., the latter concern having moved to another location. The chief engineer of the Monarch company is H. C. Limbach, who has been identified with both the engineering departments of the Studebaker company and the Cadillac. Under his direction a five-passenger 30-horsepower touring car will be built to sell at about \$1,000, fully equipped.

According to present plans, deliveries to dealers will commence about May 1. A complete factory is to be built which may possibly be ready for occupancy next fall if all goes well. Mr. Hupp is a veteran manufacturer of motor cars and has been associated with his brother, R. C. Hupp, in both the Hupp Motor Car Co. and the R. C. H. Corp., although no longer connected with either of these enterprises.

LEWIS RESIGNS MITCHELL PRESIDENCY

Racine, Wis., Feb. 22.—Captain William Mitchell Lewis, president and general manager of the Mitchell-Lewis Motor Car Co., of Racine, Wis., on Wednesday retired as active head of the company, and is suc-

ceeded by J. Winterbotham, Jr. In connection with the news of his retirement there were circulated reports that the company was involved in financial difficulties, but these were quickly dispelled by reassuring statements from the officials at Racine.

The only reason given for Captain Lewis' retirement is that he desires to give his entire attention to his other interests, which include the Racine Rubber Co., formerly the Kelly-Racine Rubber Co.; the Racine Daily Times Co., publishing the leading daily newspaper of Racine, and others of equal or lesser importance. Captain Lewis established his offices in the Racine Times building immediately upon retiring from the motor works.

Reports of financial difficulties circulated in connection with the retirement of the president and general manager are denied. William T. Lewis, chairman of the executive board, and father of Captain Lewis, issued a signed statement on Friday, February 21, on the subject.

MEZGER SUES GROSSMAN

New York, Feb. 24—Charles A. Mezger, New York city, maker of the Sootproof spark plug, has filed suit against the Emil Grossman Co. for alleged infringement of his patent No. 700,147, dated May 13, 1902. The matter will soon come up in the United States district court, New York city. Following is one of the claims alleged to be infringed upon by Red Head:

The combination of a chambered plug having a sparking point thereon and elongated conducting member projected through the chamber and extending adjacent to the spark point; a tubular insulation shell arranged in the chamber of the plug and spaced from the walls thereof and from the sides of said elongated member forming a second sparking point, an insulating tube at the base of the insulating shell, a means for holding the said elongated conducting member snugly within the shell and tube.

NEW CONNECTICUT ROAD MAN

Hartford, Conn., Feb. 25—The senate this afternoon confirmed Governor Simon E. Baldwin's nomination of Charles E. Bennett, of Hartford, to the position of highway commissioner to succeed James H. MacDonald, of North Haven, who has been commissioner for the past 18 years. MacDonald, regarded as a well informed and capable road builder, was defeated by a vote of 31 to 3.

SCHIMPF TO VISIT COAST

New York, Feb. 26—William Schimpf, chairman of the contest board of the A. A. A., will leave New York for Los Angeles next week in order to take up with the Western Automobile Association the situation of contest regulations in the west under the jurisdiction of the national body.

New York Dealers' Election

New York, Feb. 25—At a meeting of the recently elected board of directors of the Automobile Dealers' Association, Inc., Harry M. Bronner was elected president, Arthur M. Day vice-president and Frank Eveland secretary and treasurer. The new board of directors of the association are Frank Eveland, M. J. Budlong, Arthur M. Day, Charles M. Brown, Harry M. Bronner, I. N. Uppercu, C. H. Larson, H. L. Stratton, William C. Poertner and W. Arthur Lesser. Charles A. Stewart continues as general manager.

Strike in Renault Factory

Workmen Balk on Using American System of Timing

PARIS, Feb. 15—Objecting to a system of timing factory operations introduced with a view to higher efficiency, most of the men employed in the Renault factory went on strike this week. The drawing office staff and sales department remained at work, and this so exasperated the strikers that they invaded the factory, drove out the men found there and caused considerable damage to machinery and fittings.

At this turn of affairs, Louis Renault gave the order for the entire factory to be closed, thus throwing 5,000 men idle. It is declared that thoroughly disgusted at the violence shown by his workpeople, Louis Renault has left Paris for Nice, and is resolved not to return until his workpeople have adopted a more sensible attitude. Meanwhile, no work whatever is being done at the Renault factory, but building operations on the new factory now being erected by the river side are continuing without interruption. The buildings are being guarded by police and gendarmes.

The initial cause of the dispute was the attempt to adopt a system of timing seen by Louis Renault on his visit to America about a year ago. This consisted in carefully timing the various operations with a view to eliminating waste, the workmen obtaining higher wages by reason of their increased efficiency. A first attempt was made to adopt the system some months ago, but met with failure. On the second attempt the men declared that the American system only sought to get artificial times from picked men working under high pressure and apply these times to the entire staff. They maintained that it was the introduction of a system of permanent rush, and refused to submit to it.

A. O. SMITH STRIKE SETTLED

Milwaukee, Wis., Feb. 24—After 3 days of negotiation, the strike of machine hands at the plant of the A. O. Smith Co., Milwaukee, Wis., was settled on Sunday, and on Monday morning every man who had walked out since the strike was called on February 19 was back at work. The retirement of a new foreman in the department in which the walkout arose, and whose personality was the sole reason for the trouble, resulted in a speedy settlement of the difficulty.

The interruption in operations due to the strike amounted to approximately one full working day of 22 hours. This will not in any measure affect the deliveries of materials to motor car manufacturers according to specification schedules.

NEW YORKERS OPPOSE MORE TAXES

New York, Feb. 24—The New York State Automobile Association, through its legislative committee, is conducting a

campaign against the increase of motor car registration fees advocated by Mitchell May. The association maintains that the proposed increase is unjust and while Empire state motorists are willing to submit to fair taxation they are determined to oppose an increase. If the measure goes through a test case will be taken through the courts.

HOOSIER TEST BILL HELD UP

Indianapolis, Ind., Feb. 26—Special telegram—The bill prohibiting use of highways by test cars in this county except to reach a test track is being held up by Governor Ralston and will not be signed. A new bill is to be prepared regulating test cars in the entire state. This probably will provide a severe penalty, including the dismissal of any employe violating the law. A bill along this line will be satisfactory to the motor car manufacturers.

STUDEBAKER REPORTS PROFIT

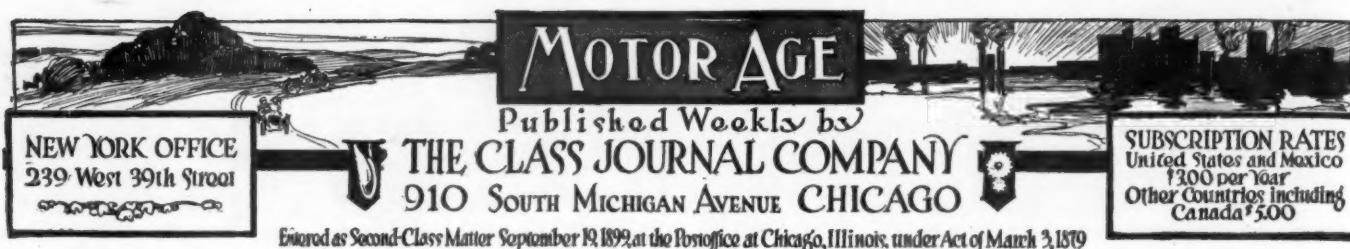
South Bend, Ind., Feb. 24—According to the yearly report of the Studebaker Corp. this large company during the fiscal year ending December 31, 1912, had net earnings totalling \$3,125,876.15. The interest on the company's 5 per cent serial notes, discount and commission on the same and extraordinary expenses aggregated \$812,631.01, leaving net profits of \$2,313,245.14. The motor car sales of the company showed a 10 per cent increase over the year 1911.

TODD BUYS POSS ASSETS

Detroit, Mich., Feb. 24—Charles D. Todd has offered at private sale, commencing today, the entire assets of the Poss Motor Co., bankrupt, which were purchased from referee in bankruptcy Lee E. Joslyn at a hearing on February 21. The sale includes the good will of the Poss concern and the right to use the name. The property consists of nine finished Poss delivery trucks, ten chassis nearly completed, fifty-five various types of bodies and other miscellaneous parts, in addition to several machine tools. The goods will be sold in parcels or as a whole if suitable offer is made. In purchasing the property from the referee, Todd paid \$5,500 in cash and agreed to turn over 85 per cent of the amount realized from the present sale. Assets of the Poss company amount to \$37,297.86, according to the inventory.

BROADWELL QUILTS HUDSON

Detroit, Mich., Feb. 22—The Hudson Motor Car Co. announces the resignation of E. H. Broadwell, who has held the position of vice-president and director of sales. Mr. Broadwell's disposing of his Hudson interests is the result of a disagreement as to company policy. The direction of the sales work has been assumed by C. C. Winingham, who also retains his position as advertising manager of the company. No announcement of his future plans has been made by Mr. Broadwell.



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Driving Luxuries Expensive

WITH the increase in the price of gasoline during the past year, the car owner, who is really concerned in the matter of fuel economy, clamored for the carbureter maker to give him a carbureter economical in operation and also looked to the car maker to produce a model with a motor of low-gasoline consumption, yet few of this same public for a moment turned the spot light on themselves to see if they could in any wise reform their methods of driving and controlling motor speeds whereby less gasoline would be consumed.

MUCH of the extravagance in gasoline consumption today, for such it can truly be termed with many motorists, rests entirely with the car owner and the driver; rests so much with these two that if more economical carbureters were fitted it is questioned if they would get more than a fraction of the rated economy. Both owner and driver delight in indulging in what might be called the luxury of the car. They want a machine with quick acceleration. The spectacular enters largely into the driving propensities of many, and few of them realize that they pay dearly for their whistle—it is all done at the expense of gasoline, not to mention the many other parts of the car on which quick acceleration exacts its heavy toll. In a word, it is luxury of the car that the owner desires, that the driver indulges in and yet one in which the motor or carbureter makers are forced to carry the burden of in the form of criticism on fuel extravagance.

BUT quick acceleration is not the only luxury that owner and driver delight to indulge in. Running so much on a low throttle is an equally important crime. Instead of shifting gears the throttle is nearly closed, the result being that the suction of the cylinders is largely exerted on the gasoline spraying nozzle and too much gasoline is drawn out in proportion to the air entering. Only a fraction of this gasoline is actually needed, the remainder in not a few cases going through the motor in a poorly combusted form, and doing its part to aid in carbonizing the combustion chamber and valves. There is also a remedy for this, namely, keeping the motor speed up, keeping the throttle at a wider-open position and shifting gears more frequently. With the throttle opened more there is a greater quantity of air entering and the cylinder suction on the gasoline is correspondingly reduced, giving a mixture still over-rich but yet more nearly approximating the desired proportions for economical running.

IF the motorist will only analyze his own actions in driving, analyze his methods of acceleration, analyze his methods of driving with regard to amount of throttle opening, and analyze his driving so far as gear-shifting is concerned he will invariably find that not a little of the unnecessary fuel consumption lies at his own door. He is breeding the luxury in driving that creates the extravagance, and do what he may the carbureter manufacturer will never be able to obtain that Utopian fuel economy until the driver, the owner, or the owner-driver is willing to do his share in the work.

THIS luxury in motor car operation dates back many years, almost to the time when four-cylinder machines made their debut. In those days the high-gear demonstration on the steep

hill proved the kindergarten for the new driver. His appetite was whetted. He was schooled in avoiding the use of the gear-shift lever, and those elementary courses have during the intervening years been succeeded by constant high-gear arguments of the salesman and demonstrator until today thousands of owners look upon it as an indication of poor driving if they may have to shift gears on a hill where the car ahead of them on the road makes it on high. It is difficult, well nigh impossible with many, to convince them that it is much preferable to change to lower gears on a hill and keep the motor speed within its range of desired efficiency and economy. The luxury of driving instilled in the early days has become a habit, and what is more difficult to uproot than a deeply-formed habit? Yet it is this very same habit that tends to increase the gasoline consumption.

FUEL price looks today as the possible tutor that will accomplish the task, or that will at least give the first lessons in rational driving. The rising price of the last 12 months nearly stampeded not a few buyers. The floodtide was reached 3 or 4 months ago; there has been a slight ebbing ever since. The announcement of Motor Spirit as a fuel for trucks, traction engines and stationary engines will create a still faster ebb, but the thin edge of the wedge has been entered and the owner-driver will not forget the nightmare that he had a fleeting vision of and which 4 months ago promised to be such a reality.

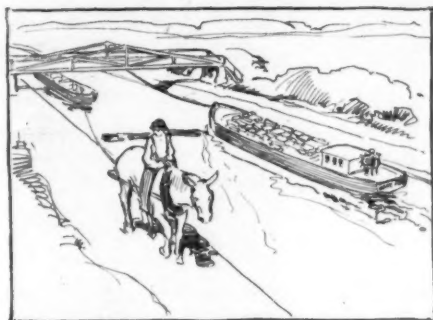
OWNERS and drivers can do much to solve the fuel economy problem; the carbureter makers must and will do their part; the car builders must do their part by reducing weight wherever possible; the road builders are doing theirs; and lastly the fuel producers are focussing every effort to alleviate the situation. The fact that there is not any real danger of much increase in the price of gasoline during this year should not create a feeling of contentedness in present driving methods. Careless drivers should reform themselves.

Lesson Taught by Akron Strike

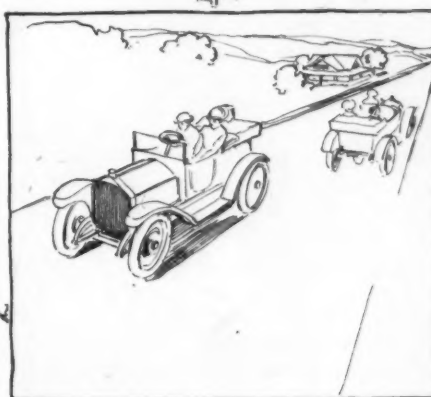
EVERY car owner will welcome the news that the backbone of the strike of employes at the Akron tire factories has been broken and that within a few days nearly all of the workers will be back in their places. The serious aspect that the situation assumed a week ago has practically passed and tire dealers feel easier. Suspension of production in many of the tire companies would produce an acute situation, in fact, prolonged inactivity would practically provoke a crisis. Every car requires tires and with the opening of the warmer season already at hand, there is certain to be the usual heavy demands. Many dealers had the foresight to immediately begin stocking up, as not a few car dealers during every winter, in order to have goods on the shelves for ready delivery when the demand arrives. Such good business policy should be fostered. It is one of the axioms of profitable merchandising to have on your counters the goods wanted at the time they are needed. With complete cars, to anticipate the demand is expensive and difficult. The dealer in low-priced machines must do it or lose scores of sales due to failure to make deliveries. This strike should be a good lesson to the unsystematic dealer who was caught napping in the present instance.

Fiction May Become a Motoring Fact

Illinois Considering Making Old Canal Into a Road



MAP SHOWING CANAL ROAD AND TERRITORY UNIQUE HIGHWAY WOULD OPEN TO MOTORISTS



CORDELIA BLOSSOM, the governor's wife in George Randolph Chester's series in the Saturday Evening Post, was elected president of a woman's state organization by having the legislature condemn an old canal and convert it into a motor road. That was fiction.

Fiction became fact last week at Springfield, Ill., when there was introduced into the legislature by Senator E. J. Glackin, of Chicago, a bill to utilize the old Illinois and Michigan canal, at present worthless and a menace to the public's health, as the roadbed of a magnificent highway leading from Chicago to Lockport and the first step in a cross-state route through the state park at Starved Rock to Springfield, the state capital. This canal road is to be 240 feet wide, 35 miles in length and built by convicts.

Senator Glackin states, however, that his idea is founded upon a firmer basis than popular fiction; that the demands of the federal government that the canal be rehabilitated and its useless and insanitary condition are responsible for his resolution. According to a decision of the supreme court, the only funds that may be expended upon the maintenance of the canal are those accruing from the use of the canal as a waterway. But, since the opening of the sanitary drainage canal which parallels it, the Illinois and Michigan canal has carried no shipping between Lockport and Chicago; consequently, no funds for repair.

By Darwin S. Hatch

It is stated that for this reason the waterway is in a very bad condition, the bridges are rotting and falling down so that people along its banks are obliged to go many miles out of their way to cross it. The cut itself is filling in and the water is so sluggish that its insanitary condition is a menace to the public health.

The Illinois and Michigan canal runs southwest from Chicago, where it connects with the Chicago river, to LaSalle, where it enters the Illinois river. Although the part above Lockport is unused, the lower portion, between Lockport and LaSalle is used by traffic on the sanitary and ship canal, so that it is possible to turn only the upper portion into a highway.

With the use of convict labor, Senator Glackin believes that the entire 35 miles of the upper portion of the canal can be transformed into a motor road varying between 50 and 240 feet in width at a cost of less than \$2,000,000. The material necessary for filling in the ditch and forming the roadbed already is on hand, being the stone and earth thrown out of the cut originally. The author of the bill sets 2 years as the time required for completion of road after the work is commenced.

If the transformation is effected as outlined by Senator Glackin it will provide the only good entrance for motor vehicles

into Chicago from the south and southwest, but more important, it will give a road for motor trucks by which the farm products of the richest section of Illinois can be brought directly into the heart of the city. Also it will tap the coal fields of the northern part of the state, Coal City and Wilmington being but little over 10 miles from the proposed terminus of the road. Tourists will find the canal road as far as Joliet the best link in the routes to Bloomington, Springfield and St. Louis.

The promoters of the scheme apprehend no difficulty from the legislature and believe that the only other sources of trouble, the federal government, and the popular necessary approval of the bond issue will be favorable.

Not only in the use of a canal for a motor road but in the labor employed, is the proposition unique. If the plan is carried through, it will be the first time in the history of the state that convicts have been employed in actual work on the roads. Illinois convicts are employed at present in the preparation of road material, but not upon road construction.

Utilization of abandoned canals as motor roads is applicable to others than the Illinois and Michigan canal. There are many others throughout the country that by little expense could be transformed from a useless slough to a public benefit, and it is probable that if the proposed scheme is carried through, other disused waterways will be rehabilitated similarly.

Motor Spirit Still Further Refined

New Fuel to Replace Gasolene Undergoes Development During Past Week—Output 15,000 Gallons Per Day—Standard Oil's Latest Product Comes at Psychological Moment—Situation Was Critical Because Demand Was Outstripping Supply

CHICAGO, Feb. 21—Further refinement in the new fuel, Motor Spirit, by which it is made still more adaptable to motor cars, was announced today by the Standard Oil Co. of Indiana. Dr. W. M. Burton, the inventor of the process by which the new fuel is produced, as reported in last week's issue of Motor Age, has succeeded in the past week in removing to a certain extent the pungent odor and at the same time has produced a distillate which is slightly lighter in color than the earlier product of his stills. The odor yet is more noticeable than that of gasoline and the yellow color still appears after the Motor Spirit has stood for several days. Still, the additional refinement is not expensive enough to bring the price over that announced last week, which is 3 cents less than that of gasoline, nor has the distillate lost in fuel efficiency; it still gives 25 per cent more mileage per gallon than do the ordinary grades of gasoline.

That there was a new fuel of such possibilities in the matter of cheapness and economy ready to be offered to the public came as a surprise to the motoring world. In fact, not till after the announcement in Motor Age last week, were the distributors and dealers of the Standard Oil Co. notified that the new fuel was ready to market.

Until last week, there were numerous prophecies of an immediate shortage in the gasoline supply which would boost the price far above a point where the ordinary motorist could afford to buy it. However, with the production of Motor Spirit, that ghost is laid for good and all and motorists may feel certain that for a good while to come they will not have to pay any higher prices for their gasoline, and there is some slight prospect of reduction before long.

Will Keep Price Down

It is not the fact that Motor Spirit is cheaper than gasoline, that is going to make motoring less a drain on the pocketbook, but the fact that the supply of motor fuel from the same amount of raw material or crude oil is more than doubled. Formerly, 100 gallons of the crude gave 20 gallons of gasoline, 20 gallons of kerosene, and 60 gallons of fuel oil, which is burned under boilers in place of coal.

Under the new process covered by Dr. W. M. Burton's patents, this fuel oil is refined and gives 30 gallons of Motor Spirit. The other 30 gallons are a residue which is sold for other purposes, and is almost or quite as valuable as the 60 gallons of fuel oil was. In other words, the Standard Oil Co., of Indiana, to which the patent

was assigned, at its refinery at Whiting, Ind., gets from the crude its regular volume of gasoline and an additional amount of Motor Spirit, a liquid very much like gasoline, except for its pungent odor. It has a gravity of from 56 to 57 degrees Baume, which is but little heavier than the 59 and 60-degree gasoline the motorist has been getting recently. It takes on a yellow tinge after standing awhile. Its odor is stronger than that of gasoline and as it evaporates more slowly, might prove unpleasant if spilled on clothing or cushions. It starts as easily as gasoline.

No Objections from Police

There is a light-colored smoke in the exhaust of Motor Spirit but not so pronounced as the bluish smoke due to too much oil in many cars. Pleasure cars have been running on the boulevards of Chicago for weeks with the new fuel without interference from the police who are instructed to put off the boulevards any car with a smoky exhaust. It is believed that the present grayish tinge will be prevented by more complete water-jacketing of the intake manifold. There is a slight increase in carbonization but the deposit is soft and responds to an application of kerosene.

Motor Spirit is not intended primarily for pleasure cars, but there is nothing to

prevent its use by them, as it will be attractive on account of its lower cost and greater mileage.

Motor Spirit is intended for motor trucks, traction and stationary engines and all types of liquid fuel motors in which gasoline has been used, and due to which the market has been so short of late. With the place of gasoline in these fields being taken by Motor Spirit, the supply of gasoline for the pleasure cars should prove adequate for years to come.

W. M. Burton, a director and general superintendent of the refineries of the Standard Oil Co. of Indiana, made application to the United States patent office on July 3, 1912 for the new method of manufacturing Motor Spirit and crude oil. On January 7, 1913, the patent was issued as number 1,049,667, assigned to the Standard Oil Co. of Indiana. The patent covering in brief, the distillation of the product at temperatures from 600 to 850 degrees Fahrenheit, under pressures of from four to five atmospheres.

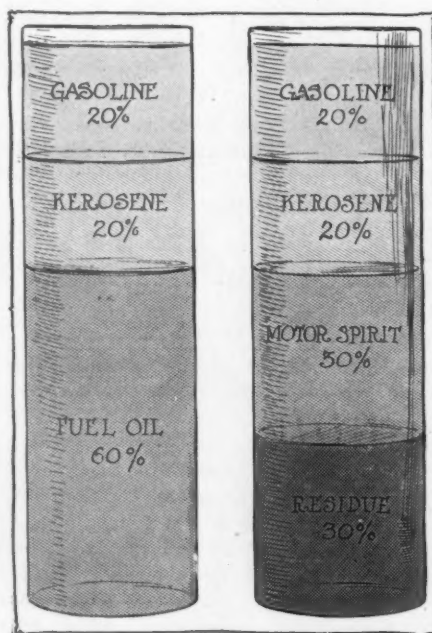
The process of distillation covered by this patent has been in operation since May 1912, when the first distillate was produced. The output of Motor Spirit is now 15,000 gallons daily and by June additional stills will permit production in much larger quantities.

The new use for the fuel oil explains the announcement which the Standard Oil Co. of Indiana made last spring that after a certain date in the fall no more fuel oil would be marketed. In fact, the marketing of fuel oil was stopped during the autumn of last year.

Fuel a Burning Question

Probably, there never was in the history of motoring and its allied industries a more striking example of the law of supply and demand and the influence of public clamor than is offered by the development of Motor Spirit at what is seemingly the psychological moment. Engineers, manufacturers, and the motoring public are investigating the fuel question more seriously than ever before.

When such bodies as the Society of Engineers formally commences an investigation, as it did by the appointment of a special committee at its recent annual meeting, and when the Indianapolis section of the S. A. E. devoted an entire meeting to the consideration of kerosene as a fuel, as it did last Tuesday; and the metropolitan section of the S. A. E. in New York announce an entire meeting devoted to a study of kerosene carbureters, it may be assumed that other branches of the industry are becoming as vitally in-



ILLUSTRATING PROPORTIONS OF CRUDE DISTILLATES

At the left is shown the percentages of fuels by volume obtained from a quantity of crude oil by the old process. At the right is depicted the motor spirit obtained by the Burton process

terested. Rapid increase in the price of gasoline in the past year has been responsible for the agitation of the fuel question.

Motor-driven vehicles no longer can depend upon the fuel they have used in the past—at least without the relief which is offered by Motor Spirit. The demand for gasoline had outstripped its production. The oil market has had to readjust itself to radically new conditions within the past 10 years. Formerly crude oil was looked upon simply as the raw material from which was manufactured oils for illuminating and lubrication.

Motor Cars Cause of High Price

The development of the gasoline engine opened up an unlooked-for market for the lighter distilled, light oils, gasoline and naphtha, which within the last decade has developed to undreamed-of proportions. For this reason, the law of supply and demand set a price on the lighter and more volatile distillates far higher than its former price level.

For 50 years the price of gasoline rose only an average of 1 cent for each 10 years, so that the advance in the last half-century up to January 1, 1912, had brought gasoline from its original price of say 5 cents to only 10 cents a gallon, wholesale. But last year, an unprecedented rise of 6 cents brought the wholesale price up to 16 cents per gallon at the close of the year. In 1912, the wholesale price therefore, advanced 60 per cent, and the retail price about 75 per cent, according to the figures of John A. Secor, of the Rumely company.

Furthermore, the gasoline of the early days, which was bought so cheaply, averaged about 72 or 73 degrees Baume, while the present commercial gasoline is about 10 degrees lower. While it probably has a little more fuel value gallon for gallon than the older grade, it makes starting more difficult. The 62-degree product now marketed as gasoline formerly was sold under the trade name of benzine.

No corporations or combinations of cor-

porations are responsible for the increase in price, it is simply that the production does not meet the demand. Reports of the United States government show that the advancing cost of gasoline is due to the inevitable law of supply and demand. Along with the increased demand, there has been a falling off in the supply of the crude from which the gasoline itself is obtained.

It is interesting to note that in January of last year when the oil men found that instead of drawing from storage as they had done before, the storage was exhausted and it took their complete production to satisfy the market, even partially, the wholesale price jumped 10 cents.

Crude Supply Failing

Production in all the oil fields is falling off rapidly—the only fields not showing decreased output are California and Oklahoma and the crude from those fields distills a very low percentage of gasoline. It was just when matters had reached a crisis that Motor Spirit appeared.

Kerosene as Substitute for Gasoline in Motor Cars Discussed

INDIANAPOLIS, Ind., Feb. 24—Kerosene as a substitute for gasoline as a motor fuel was urged before the Indiana branch of the Society of Automobile Engineers at the Claypool hotel last Tuesday night. There was a large attendance and the subject was "Motor Fuel." The principal speaker was John A. Secor, expert with the M. Rumely Co., Laporte, Ind., manufacturer of an oil tractor.

William G. Wall of the National Motor Vehicle Co., framed the program and to him is due the credit of arranging for Mr. Secor to address the meeting. Mr. Secor's subject was "Kerosene Engines," and he brought out very forcibly the need for some other fuel than gasoline in order to relieve the price situation. He showed that though the production of crude oil from which gasoline is obtained is increasing, it cannot hope to keep up with the increased demand as long as it is the generally used fuel; that the production of motor cars alone is increasing twenty times as rapidly as the crude. With this he led up to the kerosene as a fuel and the problems to be overcome in its use, ending with the method pursued in the oil pull tractor engines. In the course of his remarks he stated:

Cars Increasing in Number

A promising means of obtaining gasoline is by increasing the total yield of American crudes. A yearly production of 300,000,000 barrels in the United States probably is being approached faster than even oil men generally believe. But the largest increase in the production of gasoline in one year has never been more than 5 per cent, while the production of power-driven vehicles will in all probability represent an increase this year of around 100 per cent. Furthermore, the supply of gasoline yielding crudes is rapidly decreasing and the increased crude output will consist of Oklahoma and California asphalt oils, having insufficient gasoline for existing requirements.

The last means of increasing the available gasoline supply is by lowering its Baume gravity. It is probable that the specific gravity of commercial gasoline will be

Secor Talks to Indianapolis Branch of S. A. E. on Use of Coal Oil in Engines

dropped another notch by next summer. Much of the liquified-gas gasoline is used for blending with heavier distillates, and it naturally requires other than gravity tests to determine the characteristics of such blended gasolines.

Predictions heretofore made in regard to denatured alcohol as a fuel have not yet materialized. Nevertheless, it is probable that alcohol alone could hold down the price level of gasoline from advancing appreciably beyond 25 to 30 cents in tank car lots.

Advantages of Kerosene

But the one best fuel is oil. Oil combines more advantages than any other. It is the fuel of the future and the fuel of today. In comparison with gasoline or alcohol it is much cheaper; safe; better adapted for shipment; more uniform in quality; more highly concentrated; more powerful and above all more abundant in all localities.

Even in the distant future, when the crude oil output falls below the world's demand for liquid fuel, a practically unlimited source of oil will be the great oil-bearing shales which cannot be worked profitably at the present low price of kerosene.

After many years of observation and experience I am convinced that as a medium for generating power for transportation, on land or water, mineral oil or kerosene is the most valuable general purpose fuel known to commerce. This statement is made in full recognition of the fact that the oil engine has always had less commercial popularity than either the gas or gasoline engine.

In former days the oil engine was heavily handicapped by the high price of both crude and refined oil. Gasoline was then a by-product selling at 5 cents or even less. But the lapse of time has completely reversed the market relations of gasoline and oil. Oil production is in excess of consumption. Kerosene is now a by-product and is quoted at 60 per cent less than gasoline.

Under ordinary working conditions any ordinary engine with practically any good gasoline carburetor can use kerosene if kept at medium speeds. A Maxwell car was thus taken from New York to Boston, operating entirely on kerosene, except for starting. But the lack of adequate flexibility becomes increasingly apparent as the speed and power are reduced. It slowed down the car will not pick up.

The Secor oil engine—used in Rumely tractors—embodies a fuel method which differs radically from other oil engines, both in principle and in operation. It has for its objective, commercial efficiency. The system is primarily designed for commercial efficiency. For it is believed that adaptability, reliability

and power cost are the factors, which determine relative marketability.

The Secor system recognizes that oil differs from gasoline in that it is:

1. Non-volatile.
2. Contains more B. T. U. per gallon and is heavier. For example 65 degree gasoline weighs 6 pounds per gallon; kerosene weighs 6½ pounds; 37 degree distillate 7 pounds and 31 degree crude 7¼ pounds.
3. Oil is practically incombustible at ordinary temperatures.
4. Its range of combustible mixture proportions is much narrower than that of gasoline.
5. The physical conditions for complete combustion are more exacting than in the case of the volatile liquid fuels or gases.

It resembles gasoline in that it is composed of complex chemical constituents with widely varying temperatures of vaporization.

A multiple-unit governor regulates fuel mixture proportions.

Supplying weaker mixtures for higher compressions and relatively stronger mixtures for low compressions and power output; quantity of fuel mixture; internal temperatures during compression, ignition and combustion. This is accomplished by adding variable quantities of finely atomized water to the fuel mixture, the quantity of water being determined with the variation of temperature within the combustion chamber; ignition timing; speed control and the use of gasoline for starting.

An oil carburetor or mixing chamber has been invented by William H. Higgins and is being used exclusively in connection with the Secor system, and is therefore known commercially as the Secor-Higgins carburetor. Its operation is positive and instantaneous. While it controls with precision the quantity and proportions of the fuel charge, it dispenses with all automatic mechanism within the carburetor itself. Its control is external and positive.

Kerosene as Motor Truck Fuel

In view of this and of what is claimed for the Secor-Higgins carburetor, and what it has already accomplished, is it adapted for the power car and motor truck? In reply, I must say, frankly, that I do not know. We only know that this carburetor has made good in the agricultural field, and that it is now taxing to the limit the large productive capacity of the M. Rumely Co.

We have had no time to take up experimental or research work along motor car lines. But we think it may be safely predicted that the time is at hand when gasoline will no longer be the sole fuel, or even the leading fuel for the motor car. We think it is also safe to predict that the coming oil motor car engine will demonstrate the fact that one definite proportion of fuel to air does not give the best results under all circumstances, but that the ideal mixture must vary with every change in working conditions. Also it is demonstrated that the heated carburetor is a delusion and utterly impracticable.

Prosperity of Ford a Business Romance

N. A. Hawkins Tells Adcraft Club How Company Started 10 Years Ago with \$28,000 Capital and Now Sells \$200,000,000 Worth of Cars and Parts Yearly—Army of Employees Numbers 18,061 and Daily Payroll Is More Than \$30,000

DETROIT, Mich., Feb. 21—Just what it means to manufacture 200,000 complete motors cars in 12 months was told by N. A. Hawkins, general sales manager of the Ford Motor Co., at the dinner of the Adcraft Club and the Board of Commerce at the Cadillac hotel last night.

In a story bristling with big figures and full of the romance of business, Mr. Hawkins touched upon the marvelous growth of the Ford plant from a pigmy to a giant. Ten years ago the company was capitalized at \$28,000, and did an annual business of \$200,000. Today it is the largest motor car factory in the world; has a capitalization of \$30,000,000 and sells annually \$200,000,000 worth of cars in all parts of the world.

Immense January Business

"Ford profits," said Mr. Hawkins, "are equivalent to maximum industrial earnings on a capitalization of \$200,000,000, and on this basis probably could, before its twentieth anniversary, return the equivalent of this amount to its shareholders. The January sales of Ford cars were nearly \$9,000,000, or more than twice the gross receipts of the Grand Trunk railway system for the same month. In the last 4 months we did a business of nearly \$30,000,000, and 2 of those 4 months were not real good ones.

"The Ford company has all the elements of a successful enterprise. It manufactures a useful article; its company is properly organized; it is amply financed, entirely within itself, to successfully carry on its operations; its business policy is clear and well defined; its management is capable, tactful and honest; its factory is well designed, fully equipped and suitably located; its product is perfect in design and quality; its selling force is efficient, the largest of its kind in the world.

Capital at Start, \$28,000

"The Ford is an organization of all young men. Not an executive head has been added to a single department of the business in more than 6 years, during which period the output of cars and annual sales have nearly doubled each year. All this great business has been built up from an original cash capital of only \$28,000, and without ever borrowing a dollar or issuing any paper. We used banks only as depositories to lock up money and earn interest, and this season, in planning a production of 200,000 cars, we never consulted with a banker.

"We are at present employing in our factories and at our branch houses 18,061 men, and all day workers, not a piece worker in the plants, and disbursing

monthly about \$700,000 for pay rolls. Every day, except Saturday, is pay day, and our average runs between \$30,000 and \$35,000 daily. We recently figured out that the total number of men employed in various plants throughout the country making Ford parts would populate an entire city like Atlanta, Ga., or Columbus, Ohio.

"Our factory, which now practically covers 65 acres, is about as complete and up-to-the-minute as modern architecture and latest machinery and labor-saving appliances can make it. As an illustration, we have a multiple drill that makes forty-five holes in one operation in the motor casting and does 1,000 castings a day. A plant building only 10,000 or even 20,000 cars in a year would have only about 10 or 20 days' work during the season for such a machine. We have two special piston machines that take the place of eighteen men and eighteen old-type machines, doing all the necessary operations on eight pistons every 1½ minutes. These are the things that reduce the costs and make for a better and more nearly standardized article. There isn't a vise in the Ford factory—no chance to do any bench work to straighten out the defects in any imperfect parts—they must fit or go to the scrap heap.

Net Assets \$25,000,000

"Our going inventories of raw materials, parts, accessories, etc., are running along now at an average of about \$7,000,000, and, mind you, every car that we build each day is shipped the same day, so none of this amount is for finished cars. Our total net assets are close to \$25,000,000.

"To give a better idea of the economy in producing in a factory like the Ford just one model or chassis, and to continue building the same car for 6 years, listen to some of these figures and items:

"June 24 last, a schedule of manufacturing our 1913 output was decided upon. To handle this production we require 1,000,000 lamps, 800,000 wheels, 800,000 tires, 90,000 tons of steel, the hides from 400,000 cattle to furnish the leather for upholstering the bodies, the hair or bristles from 6,000,000 hogs to stuff into the upholstering, 12,000,000 hickory billets for wheel spokes, nearly 2,000,000 square feet of glass for the windshields, 750,000 pounds of soft soap, 15,000 tons of molding sand to make our castings, 2,000,000 cubic feet of gas per day for heat-treating, etc.

"January 13 last, we built and shipped 1,336 finished model T's—a business for 1 day amounting to nearly \$700,000, and requiring more than 200 freight cars to handle the shipments.

"On the basis of the mileage from Detroit to New York city—if we had delivered this day's output to our New York branch by driving the cars overland, we would have had a procession of model T's—just a half a mile apart—and when the first car was coming into New York the last one would be leaving the factory.

"During January we built and shipped 17,601 finished cars—a net volume in dollars and cents of nearly \$9,000,000—more cars than we built and shipped during the first 5 months of last season. By the end of February, the close of our first 5 months for 1913, we will have shipped more than 56,000 cars, as against 17,555 for the same period a year ago.

Orders Piling Up

"In spite of our increased facilities for producing, our daily orders are in excess of our daily output, as evidenced by the fact that in spite of all the great shipments we have made we still have on file for immediate attention 38,326 orders, or a sufficient quantity to take us through to April 10, at the rate of 1,000 cars a day.

"Our traffic manager recently advised that we would require 35,000 freight cars to move our 1913 output.

"According to our output this season, and according to the most authentic estimates of other car makers, we will produce every other car that is built in this country during 1913.

"One day last week we gave one tire concern our check for a little less than \$2,000,000, and every other single part that goes into the construction of our cars bears a similar comparison to the completed job so that you can get some idea of quantity production.

"By September 30 we hope to have at least 400,000 satisfied users voicing our sentiments. Four hundred thousand Ford owners mean 400,000 voters for good roads, because most Ford owners are their own drivers; and when good roads are linked up all over the country, I hate to think about our annual production to supply the demand for these individual Ford transportation lines."

GOODRICH REPORT ISSUED

Akron, O., Feb. 24—Announcement is made of the report of the B. F. Goodrich Co. for the 9 months ended December 31, 1912, which shows that the net earnings were approximately 4.65 per cent on common, and that in the same period the company paid three quarterly dividends of 1¼ per cent on preferred and two quarterly dividends of 1 per cent on common.

The company's balance sheet shows there

was charged off out of the capital surplus \$2,200,000. At the same time the company retired \$2,058,700 of preferred stock at a cost of \$2,227,117. The plan under which the company was organized did not require the retirement of but 3 per cent per annum, whereas about 6.8 per cent was purchased. Following are the income account and balance sheet:

Net sales	Dec. 31, 1912
Manufacturing, selling and general adm. expenses	\$37,533,861
Net profits from operation.....	33,814,527
Miscellaneous income.....	\$ 3,719,334
	517,844
Total income	\$ 4,291,178
Deductions—	
Depreciation	\$440,851
Interest on bills payable..	327,838
	768,689

Net profits carried to surplus..\$ 3,522,489
The consolidated balance sheet as of December 31, 1912, follows:

ASSETS

Plant, good will, patents, etc., less depreciation and after deducting capital as of April 1, 1912, of \$2,200,000, applied against good will	\$70,685,722
Investments in other companies.....	1,635,958
20,587 shares of 7 per cent cumulative preferred stock in treasury at cost	2,227,117
Current assets—	
Inventory of raw materials partly manufactured and finished stock	\$16,226,640

Trade accounts receivable, less reserve for bad and doubtful accounts and discounts.....	5,147,703
Other accounts receivable	1,223,186
Bills receivable	606,944
Cash in bank and on hand	803,225
	24,007,698

Deferred charges to future operations—prepaid insurance, interest, taxes, etc.	229,619
Total	\$98,786,114

LIABILITIES

Capital stock—	
Common stock	\$60,000,000
Cumulative 7 per cent preferred stock	30,000,000
Current liabilities—	
Bills payable	\$ 6,479,410
Accounts payable	653,185
Sundry accrued liabilities	547,283
	7,679,879
Reserve for contingencies	300,000
Surplus	
Net profits for the nine months ended December 31, 1912, as per annexed statement ..	\$3,522,489
Dividends—7 per cent cumulative preferred stock for period ended December 31, 1912....	1,519,506
Common stock	1,196,748
	2,716,253
Net surplus	806,235
Total	\$98,786,114

AWAITS COLUMBUS BUGGY REPORT

Columbus, O., Feb. 22—The committee named by the creditors of the Columbus Buggy Co., which went into the hands of

Daniel McLarin as receiver recently, will not formulate a plan of reorganization until after the appraisers named by the federal court will report on the assets of the corporation. It was believed that more intelligent work could be done by the committee after the appraisers' figures were made. The appraisers are expected to report in a few days.

The report of Receiver McLarin was filed recently in the federal court showing the receipts and expenses since the receiver took charge of the concern. The total receipts up to February 14 were \$57,668.29 and the expenses, \$33,012.91, leaving a cash balance on hand of \$24,655.38. The receiver will make similar reports from time to time.

PREST-O-LITE PUSHES RE-FILL CASE

Syracuse, N. Y., Feb. 22—The Prest-O-Lite Co. has brought a test case in the municipal court in this city in an attempt to stop the re-use of its tanks by supply dealers. The action is against the Central City Rubber Co. to recover a penalty of \$100, under section 367, article 24, chapter 20 of the general business laws of the state.

On the Minor Circuit—Recent Exhibitions in Many Cities

NEW ORLEANS, La., Feb. 24—Attendance at the show, which closed yesterday, was 20,000. This is somewhat smaller than on previous years, but is accounted for by the fact that previous shows have been held during the Mardi Gras season, when many of the visitors were attracted only by idle curiosity. This year, with the show being held during Lent, it is certain that the greater part of those who paid admission had some active interest in motoring.

Actual sales made during the show were larger than during any of the previous shows. Another feature that was brought out plainly during the exhibition was the interest taken by residents of the smaller towns and country districts. The extension of good roads has made the use of motor cars practical in many sections of the interior of the state, and this improvement is being reflected by increased business in pleasure cars.

Some disappointment is expressed by agents for commercial cars, as few sales were made during the show. Others are optimistic, as there is much promise of business in the near future.

Farmers Buy at Davenport

Davenport, Ia., Feb. 23—With a total attendance of 6,000, the 5-day tri-city show came to a close tonight, the largest and most successful show in point of attendance, number of exhibits and number of sales that has ever been held here. There were fifty-nine cars in all on exhibit, placed by twenty-five dealers of Davenport, Rock Island and Moline.

Electrics were one of the most popular

of the exhibits this year, five makes being represented. High and medium priced cars appeared to attract the most attention, and it was in these classes that the most sales were made. Owing to lack of room, no trucks or factory exhibits were allowed.

Dealers reported that the largest percentage of buyers were farmers or residents of small towns adjoining the tri-cities. On one day there were 800 out-of-town visitors. Attendance, despite 2 days when a snow storm cut down the gate receipts, was one-third better than last year.

Bloomington on Circuit

Bloomington, Ill., Feb. 22—The third annual show of the McLean County Automobile Club was held at Bloomington Wednesday, 22,500 attending, greatly exceeding the attendance of the two preceding events. Sixty cars were exhibited, together with motorcycles, accessories, etc.

Cincinnati's Third Show

Cincinnati, O., Feb. 24—The third annual show of the Cincinnati Dealers' Association opened this evening in the north wing of Music Hall. The exhibition is to last for 10 days, the first week going over to pleasure cars and the period between March 3 and March 5 for trucks. More than 350 vehicles are on display, besides a great number of motorcycles and accessories.

Richmond Holds Show

Richmond, Va., Feb. 24—The first show held in Richmond this week, from Monday to Saturday, matinees afternoons, proved a success, and many cars were disposed of. The display embraced thirty-one exhibitors,

who showed sixty-eight pleasure cars and seven trucks and wagons. The show was held in the Horseshow building. The exhibitors used 14,000 square feet. The show was given under the auspices of the Richmond Automobile Dealers' Show Association.

Baltimore Breaks Sure Record

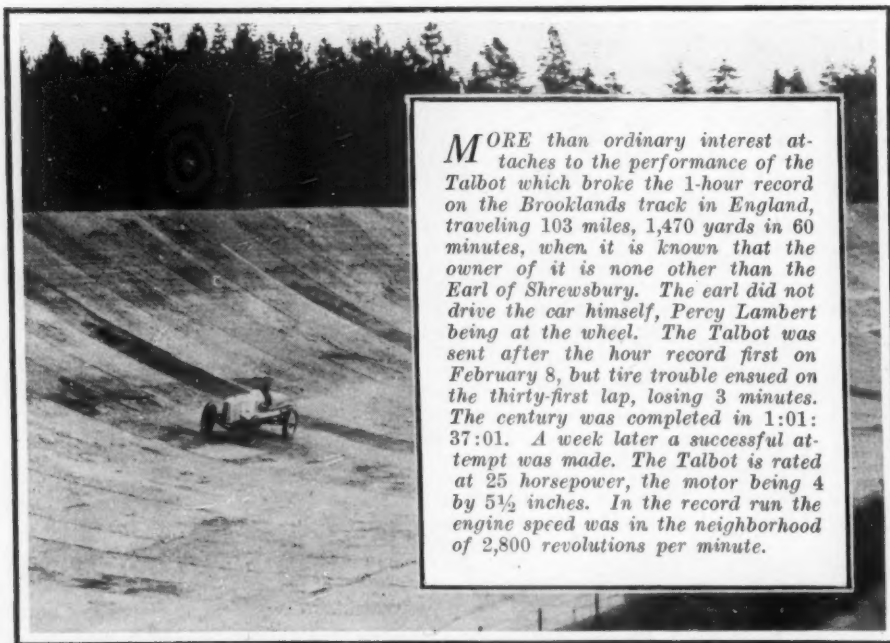
Baltimore, Md., Feb. 24—When the curtain fell at the Fifth Regiment armory Saturday night it marked the close of the most successful motor car show Baltimore has ever held. More sales than at any previous show were made, more cars were on exhibition, and the attendance broke all previous records, 35,000 being the count at the gate.

There were forty-three exhibitors at the show and more than 200 cars and trucks on the floor of the armory. All of the dealers report a large number of sales but the record seems to have been carried off by the Ford Auto Co., handling the Ford car, which reports the sale of 143 cars during the show.

Phoenix Has First Show

Phoenix, Ariz., Feb. 22—A distinct success from every point of view was the first show of the Arizona Automobile Association, held in the new garage of Ferguson-Mohn & Co., on North Central avenue. For 2 days and evenings the show was open and it was visited by thousands of people from all over the state, there being many visitors in the city at the time for the celebration known as the Aztec sun fete. The reports received by the dealers show there is a good year ahead.

Earl's Car Smashes the World's Hour Record



MORE than ordinary interest attaches to the performance of the Talbot which broke the 1-hour record on the Brooklands track in England, traveling 103 miles, 1,470 yards in 60 minutes, when it is known that the owner of it is none other than the Earl of Shrewsbury. The earl did not drive the car himself, Percy Lambert being at the wheel. The Talbot was sent after the hour record first on February 8, but tire trouble ensued on the thirty-first lap, losing 3 minutes. The century was completed in 1:01:37:01. A week later a successful attempt was made. The Talbot is rated at 25 horsepower, the motor being 4 by 5½ inches. In the record run the engine speed was in the neighborhood of 2,800 revolutions per minute.

EARL OF SHREWSBURY'S TALBOT ON BROOKLANDS TRACK

French Grand Prix Meet 2-Day Event

Big-Car Road Race Will Be Run Saturday, July 12, at 560 Miles—Motorcycle Contest on Morning of July 13, and Test of Cyclecars and Sidecars During Afternoon

PARIS, Feb. 15—It now has been definitely decided that the French grand prix shall be a 2-day event on Saturday, July 12 and Sunday, July 13. The first day will be devoted to the 560-mile big-car race on a fuel consumption basis equalling 14.1 miles to the gallon, and for which eighteen cars are now regularly entered. On the second day there will be two races, one in the morning being for motorcycles, and one in the afternoon for cyclecars and motorcycles having a sidecar attached. The rules for the second day's race have not yet been published, but it is understood that the distance will be 200 miles for each race, with a minimum average speed of 60 kilometers an hour for the motorcycles and 50 kilometers for the sidecars. It is expected that there will be from forty to sixty starters in each of the second day's events. Very strong English representations is promised.

As the result of a visit to the course, it has been decided to abandon the proposed scientifically banked cross road. The two main legs of the course run almost parallel and only 120 yards apart for a distance of over a mile, before they unite at a point known as La Fourche. Instead of taking the cars round the existing hairpin, it was proposed to build a cross road a quarter of a mile from the present turn, with such a banking that high speeds could be maintained.

A close examination shows that owing to

the difference of level of the two roads to be united this task would be both difficult and costly. In consequence, an ordinary cross road with the angles rounded off and a slight amount of banking at the inlet and the outlet, will be built. This road will have a cement surface.

The original plan of building the grandstands around this cross road will be adhered to, with the pits on the inside of the bend. Work already has begun on the course, trees being chopped down where it is necessary to get greater width, a couple of thank-you-mam's removed, and the grassy banks levelled. It is anticipated that the course will be in excellent racing condition for the month of July.

Michelin still refusing to race, rival tire firms are showing a considerable amount of enthusiasm in speed contests. Already four tire firms have rented pits on the Amiens course; they are Continental, Dunlop, Palmer, and Pirelli. The Bosch Magneto Co. and Oleo Spark Plug Co. also have secured positions, at the pits.

GOPHERS BID FOR A. A. A. TOUR

Minneapolis, Minn., Feb. 24—The trustees of the Automobile Club of Minneapolis meet tomorrow noon to consider ways and means to obtain a guarantee fund with which to back an invitation to be extended by the Minneapolis Civic and Commerce Association for the 1913 national reliability tour of the A. A. A. to start from Minne-

apolis and run west, preferably over the northern transcontinental route laid out last summer by A. L. Westgard as far as Glacier.

It is understood that the Great Northern road will operate one or two complete hotel trains to run along the route for three meals a day and night lodging, if this route is followed. This route is similar to that of the 1911 tour of the Minnesota State Automobile Association as far as Helena. The proposed A. A. A. route would turn from Havre and run westward 180 miles. Satisfactory return freight rates on the motor cars is to be made and entertainment at the park which will make the occasion long to be remembered is promised if the proposed schedule is carried out.

Dr. C. E. Dutton is chairman of the committee to arrange for a tour. Asa Paine, fifth vice-president of the A. A. A., is vice-chairman and E. C. Hillweg is secretary.

TRUCK RELIABILITY PLANNED

Washington, D. C., Feb. 25—A 4-day motor truck reliability run will be held May 5-8, under the auspices of the Washington Post. The route, which will cover about 300 miles, has not been definitely determined, but will be over a section of the country which will give diversity to the test. The classification will run from the smallest delivery wagon to the heaviest trucks. It is intended to interest government officials in the test, and to this end invitations have been extended to various officials to participate. Already a number of acceptances have been received, particularly from members of the general supply committee, which frames all the specifications for motor trucks and every other commodity purchased by the government. The run will be conducted under the rules of the A. A. A.

HOLDS JOY-RIDING NOT THEFT

Milwaukee, Wis., Feb. 24—That joy-riding does not constitute larceny or theft of a motor car, no matter if the car is damaged and abandoned, and theft insurance does not cover the damages arising from joy-riding, was the decision of Judge Cordes in the civil court at Milwaukee, in the case of William K. Murphy against the Hartford Fire Insurance Co., to recover \$400 damages.

Mr. Murphy gave his car into the hands of one George Murray, to be taken to Beaver Dam, Wis., for overhauling. While the car was in Beaver Dam, it was alleged that two of Murray's friends took the car one evening and, after a wild joy-ride, damaged the machine \$400 worth and abandoned it at the roadside.

Mr. Murphy carried theft insurance, as well as fire protection, in the Hartford, and demanded restitution in the amount of \$400. The insurance company denied his request, on the ground that the action of joy-riders does not constitute theft, and

that the car had not been stolen within the intent of the law.

Judge Cordes instructed the jury to return a verdict in favor of the defendant insurance company, which was done, and the case was ordered dismissed.

This is the first decision of this kind in Milwaukee county, and it is expected that Mr. Murphy will appeal. So far as is known, owners whose cars have been stolen for joy-rides and later recovered in a damaged condition always have been able to collect the amount of the damage under the theft clause in the standard fire and theft policies. In cases where the thieves were apprehended, the owners generally prosecuted under the larceny statutes, but without much effect.

gravel road \$850 per mile. On macadam road it is proposed to increase in the same manner at the rate of \$100 per foot. The scheme of the department also proposes a tax of 50 cents per horsepower on motor vehicles, excepting trucks, which would be taxed 25 cents per horsepower.

MILLION FOR MICHIGAN ROADS

Detroit, Mich., Feb. 24—The state highway department has asked the Michigan legislature for an appropriation of \$1,000,000 for the coming 2 years for the work of the department. It also asks for \$150,000 to care for a deficiency for work done during the last 2 years and for \$250,000 as a starter on trunk highways.

It is proposed to increase the state reward on gravel roads at the rate of \$50 per foot per mile for each foot additional width over 9 feet and up to 16 feet. This would make the state reward on a 16-foot

More Entries for Indianapolis Race

Henderson with Knipper to Drive and Fox Special, Wilcox Pilot, Among Recent Nominations for 500-Mile Grind—
Rich Prizes Offered by Accessories Manufacturers

INDIANAPOLIS, Ind., Feb. 24—Arrangements have been completed by the Indianapolis motor speedway management to give the Remy brassard, the Prest-O-Lite trophy and the Wheeler & Schebler cup in connection with the 500-mile race to be given at the speedway May 30.

The Remy brassard will go to the driver leading at 200-miles and the Remy trophy to the owner of the car; if the driver uses Remy ignition he also will receive \$50 a week for 20 weeks. The Prest-O-Lite trophy will go to the driver leading at 300 miles. The Wheeler & Schebler cup will go to the driver leading at 400 miles, and if he uses a Schebler carbureter he will also receive a cash award of \$1,000. These prizes are in addition to the cash prizes offered by the speedway management.

It is announced that a special prize will be given to the driver leading at 100 miles. This will be the Red Head trophy, offered by Emil Grossman, manufacturer of Red Head spark plugs. If the driver uses Red Head spark plugs, he will receive from Grossman \$10 a week for 50 consecutive weeks, in addition to the trophy.

The Henderson Motor Car Co. has entered a Henderson, making the sixth formal entry thus far for the race, and has nominated Billy Knipper as driver. Entries that are absolutely assured, but have not

been made formally, include three Mercers, two Peugeots and a Sunbeam. It is regarded as likely other entries will include teams of Mason, Isotta and Case cars. E. C. Patterson, of Chicago, has started negotiations to import a Silent Knight Mercedes which he will start at Indianapolis, Elgin and Savannah.

Frank P. Fox, of the Frank P. Fox Co., Indianapolis, has formally entered a Fox Special in the 500-mile race, nominating Howard Wilcox as driver. It will have a four-cylinder motor, 4¾-inch bore by 5½-inch stroke, with a piston displacement of 389.9 cubic inches.

The speedway management contemplates giving the winner of the event a plain iron cross which would have the same significance in motor racing circles that the Victoria cross of England and the iron badge of Germany has to the soldiers of those countries.

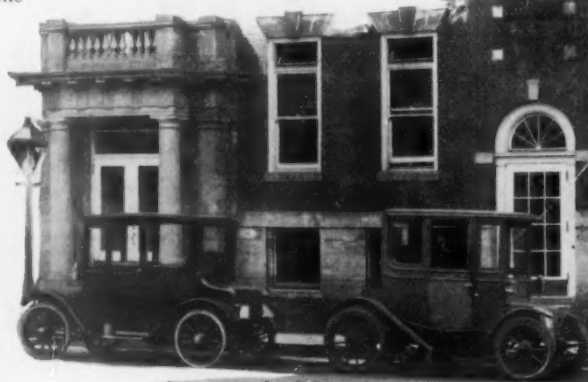
Motor Car Helps Surgeon Perform Operation

THE Children's Memorial Hospital, 735 Fullerton avenue, Chicago, witnessed an unusual example of bone surgery recently, in which a motor car played an important part, and two little patients who were suffering from tuberculosis of the spine there were able to receive the benefits free of any charge.

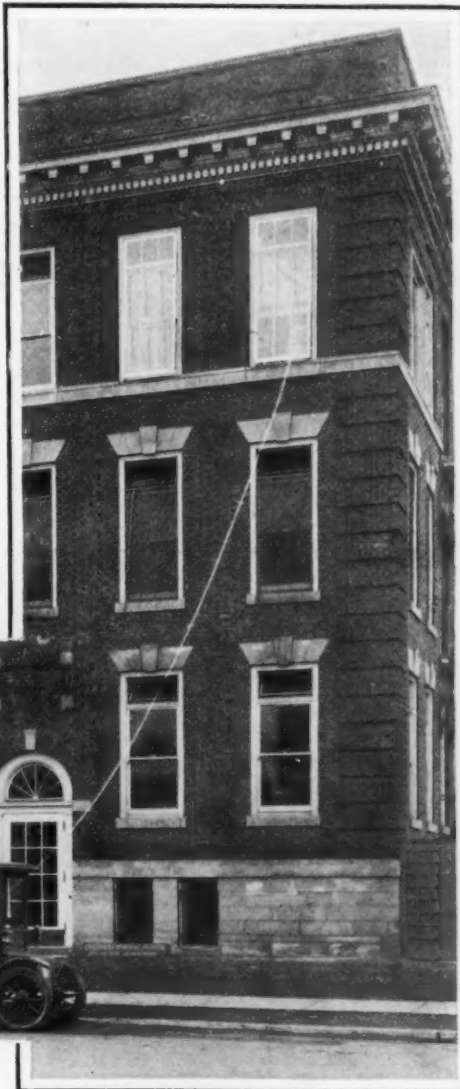
The operation in question is one of which Chicago has known but five instances. Dr. Frederick A. Albee, of New York city, devised it, and was himself present as an aid to Dr. E. W. Ryerson, the head of the institution. In the two cases to be treated the front spine had been eaten away until the patients were humpbacked to a pitiable degree. An electric motor controlling a circular saw must be used in the operation to cut away a strip of bone about ½ inch wide, ¼ inch thick and about 6 inches long from the patient's upper leg. This bone then is transferred to the front spine, thereby straightening it in the manner necessary to healthy growth.

When Dr. Albee arrived from New York city, however, it was made known that his instruments operated on direct electric current only, whereas all the hospital lighting was alternating or indirect variety. The Commonwealth Edison Co. was hastily telephoned, but it could do nothing but supply a transforming machine, which would take too long to install. A powerful electric bat-

tery thus was the only thing possible to supply the necessary current, and Dr. Ryerson decided to seek the services of an electric motor car. Calling up Bruce Borland, of the Borland-Grannis Co., Chicago manufacturer of the Borland electric car, an emergency machine was soon on the way, and with a cord running from the machine up through the three-story hospital window and there attached to the necessary surgical instruments, direct current was supplied promptly, and the two delicate operations performed in what is now believed to be an entirely successful fashion.



MOTOR CAR AS SURGEON'S AID



Routes and Touring Information

Canal Zone Interesting to Visiting Motorists

Not Many Roads on Isthmus Now but Tourists Should Take Their Cars

WHEN that great day comes in 1915 and the nuptial ceremonies are in order for the wedding of the Atlantic and Pacific oceans, and the United States glories in its greatest achievement—the building of the Panama canal—the earliest method of conveyance, travel by water, will be in the zenith of its power. But a significant fact, coupled with the formal opening of this mammoth enterprise is that it will pave the way for a greater field in the motor industry of the world. To this statement might also be added that the entrance and influence of the United States into Panama already has been a boost in the motoring firmament.

Work Done by Uncle Sam

No sooner had Uncle Sam gained control in the canal zone than he took immediate steps towards a general cleanup in a sanitary way, and this included the rebuilding of roads and the pavement of streets in the two leading cities of the Panamanian republic, Colon and Panama. The United States paid for the street improvements and encouraged the little republic to build macadam roads into the interior, and, at the present time, a national highway is under construction, which will cross the isthmus.

The ideal roadways being built in the canal zone proper and in Panama itself mark a new epoch, not only for that country, but for Central America as a whole. The spirit of good highways has spread to neighboring republics, and Costa Rica, Nicaragua, Guatemala, and Honduras are taking up the system of bettering their



SHOWING PANAMA'S PROXIMITY TO FLORIDA

By W. Blaine Patton

roads. This means, that eventually a chain of roadways will be in operation whereby it will be possible for one to make a trip by motor direct from the United States to the canal in Panama.

Convicts Work on Road

In a trip which I made through these Central American republics I noted that a very few cars were in use. This is a new field for the motor industry, and when the roads are completed, and the gasoline brigades wend their way through these countries, conditions will be ripe, and it is reasonable to believe that there will be a big demand for machines.

The roads in Panama are being built by

Highways of Panama Built by Convicts and Run Through Picturesque Country

convict labor, and lead through some of the greatest scenery to be found any place in the world. Practically all of these will be completed when the canal is opened to the commerce of the various nations in 1915. Of course, there are more Americans in Panama than in any other republic of Central America, and we find more motor cars in use there.

Interesting Sights

With so many places of interest, both historical and otherwise, to visit when the canal is finished, and all of the roads in good condition, many tourists will find it a splendid idea to take their cars along on the trip, even if they go by boat.

Historic Panama! What a world of meaning can be conveyed in these two words. To follow the trail blazed by the infamous, and yet famous pirate chief, Morgan—unequaled in the annals of all ages—and to view the ruins of the ravages of his band on the isthmus, dispel all wonder concerning the wealth of material for the volumes which have been written of this strange land, and, yet, the half never has been told.

Within gunshot of the canal, where the workers are busily engaged with the ceaseless, apparently never-ending task of blasting the mighty stone layers of strata with tons of dynamite, and the ponderous steam shovels vomiting their heavy cargoes into conveyances to be carried away by shrieking engines, one may turn to a wilderness—a most melancholy one.

The wilderness is the same today, with the exception of the new roadways, that it



NATIVE HUTS FOUND IN INTERIOR OF ISTHMUS MAKE AN OLD RUINS ON WAY TO LAS SABANAS, EXISTING FROM OLD SPANISH TIMES



BOARD HIGHWAYS ALONG CARRIBEAN SEA NEAR COLON



WELL-PAVED STREETS IN CRISTOBAL IN CANAL ZONE

was on the beautiful September morning in 1513 when Balboa with his scant, tattered crew, pushed through the tangled Panamanian jungle and viewed the Pacific from the mountain peak near Culebra, which now bears his name.

The hum of the motor car in a few short years piercing the dense jungles which occasionally resound with the chatter of monkeys and cries of wild animals, truly will seem in strong contrast of centuries of inactivity on the part of man, and the motorist will be treated to many interesting sights.

Four centuries have passed, and out of the immediate zone of the canal proper, except for occasional huts of straggling native villages which are in close proximity, the jungles, with their tales of fabulous wealth, still hold their secrets. Few are the places of the interior which ever have been visited by white men.

Romances of the Isthmus

The sea-spoilers and sea-rovers, fortune-seekers and dashing pirates, forming daredevil crews under the leadership of such men as Morgan and Drake, using the isthmus as the natural gateway to carry spoils attained by conquest from the South American Indians during the halcyon days when this neck of congested mountain land was swayed by Spanish rule, have left crumbling footprints of their greed. To tramp the same ground as followed by the pillaging buccaneers, and gaze o'er the scenes of their scarlet-dripped sabers, causes a shudder at the frowning walls, damp dungeons of moldy castles in part, and the panorama of desolation.

It was the sword-slash period following the bloody Peruvian conquest in 1670 that Morgan's band of pirates appeared before Panama City, the Beautiful, the ruler of the Pacific lands, and, aided by strange fate, pillaged and destroyed everything before him. The scars of his ravages still remain—the lizard and scorpion breeding walls and decay of the once famous city.

Five miles from the ruins

the new Panama City has sprung up in its stead. A few scattered huts, broken and crumbling masonry, snakes and creeping reptiles enjoy life such as it is on the site of the city which has ruled the new world. So ragged and wild is the trail which leads to the historic relic of torch-blackened walls that those tourists who care to make the venture must make part of the journey on foot. Even this method of travel is limited to the dry season, the paths of red clay being submerged during the rainy part of the year.

Good Road to Old City

There, however, is a first-class road, which has been recently built, that leads up to the near approach of the ruins of the old Panama City, which the motorist can use when making the trip, and no tour of Panama is complete with this left off the itinerary.

Historians tell us that when Morgan's buccaneers made the attack on old Panama City, the Spanish garrison sallied forth driving a starving mad drove of cattle ahead. The stampede began. The frightened animals charged forward, but the dry underbrush caught fire ahead following a volley of shot, and the frenzied cattle turned into retreat and completely demoralized the ranks of the Spanish soldiers. Seizing the advantage, Morgan's looters made quick work by the use of the torch, and sacked and burnt the golden city of the Pacific. To cheat the pirates great chests of gold and precious stones, bound for the royal courts of Spain, were taken out to sea, holes chopped in the

bottoms of the boats, and the richest part of the booty was sunk fathoms deep.

Life-long searches have been made for these very riches; the seas, the jungles, and the old ruins have been ransacked; fabulous as the riches are credited to be, few have been benefited by these. The search has been as disappointing as the quest for the Fountain of Youth, but still the silent hunt is carried on, hope seemingly being handed down from father to son among some of the natives.

A speedy craft, 2 hours out of the harbor at Colon on the Atlantic side, will bring one to the site of old Porto Bello. It might be added that a stone roadway is at present under construction, and is being made by convicts. Here again the ravages of Morgan are found in wasteful ruin. One is awed by the mighty task that it must have been in those strenuous days to overcome such a formidable breastworks of protection—and yet the fiendish Morgan did all of this, and his revenge for the trouble was the sight of flames shooting high to the sky, and the shrieks of his victims.

Historic Porto Bello

Upon entering the fort the first sight which meets the eye is the graves of the part of the garrison who stood until the last. A mound with small white stakes bearing numbers is the only clue to the identity of those buried at the historic battlefield. Thirty yards from the entrance is the ruins of the old stone stairway which led to the top of the bluff. It

is a wearisome climb which leads up to this part of the fort. The little watch towers, where sentinels were posted night and day, still are in good order, and where the trees have not blocked the view, on a clear day one may see many miles out to sea.

The old well which furnished the water supply still remains. Tourists have dropped old cannon balls into it, and the story is whispered among the natives that below the well a golden treasure is located.



FAMOUS PORTO BELLO WHICH IS TO BE CONNECTED BY FINE ROAD

Tropical tradition has it that hordes of money have been buried in this locality—that Morgan himself hid enough money to pay for the present expenditure of the United States in building the Panama canal. An old tree knotted with age mars a little jagged projection near the ruins of the former Porto Bello. Tradition has it that this is the one which has grown in the place of the mother tree, the one to which Columbus tied his boat upon landing, more than 500 years ago, to trade with the natives.

The jungle ruins of the old Porto Bello are around Colon Bay to the right, while the even wilder and more desolate waste of jumbled masonry and roofless walls, rusting cannon and moss-covered weapons of every warfare reached by a trip of an hour and a half in the opposite direction.

San Lorenzo, looking out on the placid Caribbean sea, presents an even more picturesque setting for a haunted graveyard of former civilization, such as it was, than anything imaginable upon the isthmus. It is located at the mouth of the Chagres river, the stream which is to furnish the water for the artificial locks on the canal at Gatun.

Picture in your mind's eye if you can see a winding path leading up from the sea; a trail used only occasionally, and so rough that footing is only possible by the use of extreme care; follow this jagged course and imagine, if you can, vines, palms and tropical vegetations of all varieties struggling with each other in the plant war for finding suitable rooting in the dense jungle; picture the trail leading up to high bluffs in front of which is

a deep moat, almost filled with underbrush and backed by the 300-year-old wall of San Lorenzo—and you have painted the approach to the fort which Morgan took in a short day's work. To appreciate the enormity of such a task one has to make the journey.

The ancient draw-bridge, which once spanned the moat, has crumbled to decay, and the old arched gateway, covered with vines, has stood the ravages of man and nature. Following the entrance where green-covered cannon lay heaped and choked with weeds, a great underground, damp chamber is reached—the torture chamber for captives during the Spanish tyranny.

The light of a torch reveals the rusty, heavy shackles and leg-irons chained to the mouldy stone wall, as they were left more than 2 centuries ago. Rings, red with age, suggest the horrors which have

taken place in that silent tomb, the remaining remnant of the garrison which was put to flight by Morgan's buccaneers.

There is practically no twilight in the torrid zone. The curtain of night comes on fast following sunset, and those who make the trip to the haunted fort take this fact into consideration. It would take a vivid imagination to conceive of a more lonesome spot than this jungle ruins after night.

The places of interest which I have enumerated are only a few which are to be seen, and if you are contemplating a visit to the canal zone at its completion don't think for a minute that a motor car as a part of your baggage will be out of place. You will find that it will come in good use, and that the roads will be first class. With a limited time on the isthmus, and a desire to see all the sights, a car will be necessary for the trip.

Answers to Motor Route Inquiries

TO YELLOWSTONE PARK

VINTON, Ia.—Editor Motor Age—I expect to be one of a party of motorists next summer in a trip to Denver, Yellowstone Park and Seattle, possibly returning via San Francisco and Los Angeles through the southern states. We understand there is a regular route laid out and post marked from Chicago, which passes a few miles south of us, and that this route leads through Des Moines, Omaha, Denver, etc. I presume the roads would not be very good for driving until June, when we expect to start. Is there any better route via Minneapolis straight through to Spokane or Seattle?—Reader.

Striking the river-to-river road at Marenco, which is reached through Garrison, Van Horne and Blairstown, you travel west

on this road to Grinnell, Kellogg, Newton, Colfax, Des Moines, Wauke, Adel, to Redfield, traversing the White Pole road to Atlantic through Stewart, Mento, Casey, Adair, Anita and Wiota, thence on to Omaha over the river road again through Marne, Walnut, Avoca, Minden, Neola, Underwood, Weston and Council Bluffs.

The Omaha-Denver transcontinental road can be followed and very fast time made on the prairie land. The first 169 miles routes through Millard, Gretna, Ashland, Waverly, Havelock, Lincoln, Emerald, Milford, Friend, Exeter, Fairmont and Hastings. This is the road with the black and white band markings on telephone poles, and the next stretch of 146 miles leads you through Minden, Holdrege, Oxford, Arapahoe, Cambridge, Indianola and McCook, reaching Sterling, Colo., through Culbertson, Wauwata, Imperial, Lamar, Holyoke and Haxtum with 167 miles travel. Sterling to Denver is 146 miles and good time should be made through Hillrose, Fort Morgan, Bennett and Watkins.

The road with the least grades to Cheyenne is 117 miles through Henderson, Brighton, Platteville, Greeley, Eaton, Ault, Pierce, Nunn, Dover and Carr, then to Douglas, 153 miles, through Chugwater, Wheatland, Uva, Hartville Jr., Badger, Glendo and Orin. A Blue Book No. 5 can be used this far for running directions, but there is no book published giving running directions on to Yellowstone. Your route would be Meadow, Goldsmith, Chugwater, Gibson, Wheatland, Uva, Foxton, Labonte, Douglas, Glenrock, Big Muddy, Casper, Powder River, Mokoma, Wolton, Moneta, Shoshoni, Thermopolis, Illo, Dickie Ranch, Meeteetse, Wiley, Cody, Wapiti, Home Lodge and Pahaska into the park.

As motor cars are not allowed in the park, you will find good accommodations provided for garaging same, and in order to get to Montana you must return to Cody, then north to Billings, Mont. Follow the Yellowstone to Big Timber, Livingston, thence to Bozeman, Logan, Townsend and Helena.

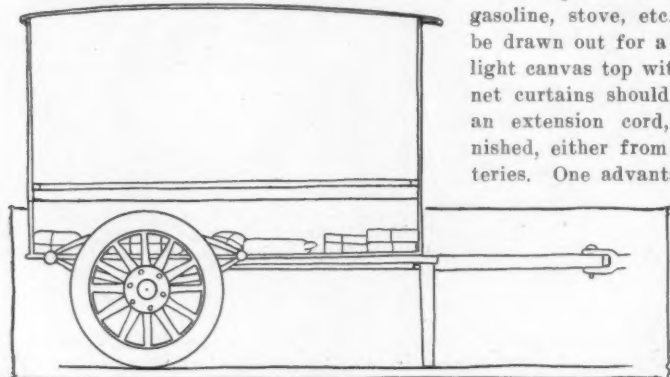
There are two good roads from Helena to Spokane via Missoula, Mont., recommended by the Swendeman Automobile Co. of Helena. The first extends through Silver, Wilber, Flesher, Lincoln, Olando, Clearwater, Bonner, Missoula, thence directly along the Northern Pacific railway to Thompson, from Thompson to Murray, Idaho, and via the regular state road to Spokane, following the railroad again. This route runs directly through the beautiful Blackfoot valley, a

Good Camping Suggestions for Touring Motorists

STOCKTON, Cal.—Editor Motor Age—I noted with interest C. E. Moyer's plan for a camping car which is a good one; also, his desire to make the trip to San Francisco camping on the way. We Californians wish to do all in our power to induce our eastern friends to make just such trips knowing full well that both here and en route they will be enabled to see more and grander scenery than in any other part of the world, and after arrival at this coast to show them a rich country

where you can run a car 12 months in the year.

For those who already have cars, or do not care to change the present style of body, I would suggest a light two-wheel trailer to be attached by link and pin to an iron bolted to the rear car frame. This can be carried on two discarded motor car wheels, or as in one instance here, on two old bicycle wheels with or without springs. A bed made of woven wire spring mattress, with compartment below to carry supplies, gasoline, stove, etc., with wide board to be drawn out for a table can be used. A light canvas top with both waterproof and net curtains should be fitted. By use of an extension cord, lights could be furnished, either from the motor or the batteries. One advantage of this plan would be the trailer. By dropping legs at both forward corners, it could be left at camp during the day and the car used by the camping party for side trips.—Reader.



Tractor for tourists, showing wire mattress, under which supplies may be carried; attachment to car and folding leg

pretty camping and good fishing place. The second route follows the Northern Pacific through Blossburg, Elliston, Garrison, thence via the state convict road to Missoula, following the railroad, thence to Spokane as outlined above. Supplies can be secured at all the towns mentioned.

Headed for Seattle the routing lies through Medical Lake, Reardon, Fellows, Creston, Wilbur, Gogan, Almira, Hartline, Coulee City, Douglas, Orondo, Wenatchee, Malaga, across the Wenatchee mountains to Ellensburg and Cle Elum or Snoqualmie. Go through Fall City, Issaquah, Renton and Georgetown to Seattle. Not a few people have preferred to ship their car from Cle Elum or Snoqualmie to Seattle, but with your camping outfit you will not mind the slow time necessary to cover this ground. This Spokane-Seattle route is a mountainous one, and you should be well provided with a windlass, shovel and plenty of rope and other devices.

The Pacific highway which is now followed takes you along the coast cities of Tacoma, Centralia, Chelhallis, Kelso, Vancouver, Portland, Salem, Eugene, Roseburg, Riddle, Grants Pass, Medford, Ashland, Yreka, Sisson, Redding, Red Bluff, Chico, Marysville, Sacramento, Stockton, Oakland and San Francisco.

For summer touring it is not advisable to take the southern route from Los Angeles through Arizona and New Mexico, etc., as it is found entirely too hot. If you wish to go to Los Angeles, follow the El Camino Real, more widely known as the Pacific highway, through Colma, San Mateo, Redwood, Santa Clara, San Jose, Los Gatos, Soquel, Salinas, Soledad, Jolon, San Miguel, Paso Robles, San Luis Obispo, Los Cruces, Santa Barba, Ventura and Hollywood. To return to Frisco you can either retrace the coast route, or, going by way of the valley of the San Joaquin river through Elizabeth, Bakersfield, Tulare, Fresno, Merced, Modesto and Stockton.

The main transcontinental highway can be taken on the return trip west, following the running directions as given by the Blue Book in volume 5 through Sacramento, Truckee, Reno, Nev., Fallon, Austin, Eureka, Elko, Cobro, Tacoma, Curleys, Snowville, Tremonton, Ogden, Echo, Evanston, Green River, Rawlins, Medicine Bow, Laramie, Cheyenne, Kimball, Sidney, Julesburg, and the North Platte route across Nebraska to Omaha, or, from Julesburg go to Sterling, Colo., retracing the Omaha-Denver transcontinental road back to Omaha.

You would not enjoy the northern route from Minneapolis nearly as much as the one outlined. It is the shortest distance, of course, but for camping, fishing or hunting enjoyment a mountainous route cannot be excelled. Another point to be brought out is the greater safety in having a party of two or more cars. If one car gets into difficulties there is always the assistance of the others to count upon. A single car must be equipped to cope with so many unforeseen troubles, thereby being compelled to carry too much overload for mountain work, that it is really a venturesome undertaking. A party of cars can be quite care-free.

FORT SMITH, ARK.—SAN ANTONIO

Fort Smith, Ark.—Editor Motor Age—I expect to take a motor car trip from this city to San Antonio, Tex., going by way of Dallas this spring, and wish to have a routing and distances. I also wish to know about how long it should take to make the trip.—C. F. Wilmans.

It is about 120 miles to Hot Springs by way of Greenwood, Huntington, Mansfield, Waldron, Boles, and Mena, and this will most probably be your first night's stop. The second day will give you 138 miles to travel in order to reach Texarkana that night. The going is through Lawrence, Social Hill, Friendship, Arkadelphia, Doby-

ville, Okolona, Boughton, Prescott, Emmet, Hope, Fulton and Homan. The third day you will have to cover 217 miles, passing through Leary, New Boston, Boston, De Kalb, Annona, Clarksville, Detroit, Blossom, Paris, Brookston, Hightown, Petty, Honey Grove, Windom, Dodd City, Bonham, Whitewright, Pilot Grove, Sedalla, Anna, Melissa, McKinney, Plano, Richardson and Dallas.

Traveling 140 miles to Waco can be considered the next day's journey and the best routing will be found via Grand Prairie, Arlington, Handley, Fort Worth, Crowley, Cleburne, Cuba, Grandview, Itaska, Lovelace, Hillsboro, Abbott and West. If you do not wish to do any sightseeing in Austin, which is 124 miles from Waco, and reached through Lorena, Bruceville, Eddy, Troy, Temple, Little River, Sparks, Holland, Bartlett, Granger, Jonah, Georgetown, Round Rock and Fiskville, you can make San Antonio the same day, and although it is 68 miles further through Buda, San Marcos, Goodwin, New Braunfels and Selma fast time generally can be made in this 192 miles.

Faster time can be made if desired, but the purpose of touring by motor car is to see sections of the country that traveling by train will not permit.

ORTONVILLE, MINN.—MONROE, WIS.

Odessa, Minn.—Editor Motor Age—Kindly publish the best and shortest route between Ortonville, Minn., and Monroe, Wis. I would prefer to keep out of the hilly district of Wisconsin as much as possible.—Guy Eddy.

In routing to Sioux Falls, Ia., you will find the country rolling, but there are no bad hills. The distance is 234 miles and the towns through which you should pass are Big Stone City, Milbank, La Bolt, Altamont, Clear Lake, Toronto, Brookings, Dell Rapids, Sioux Falls, Worthing, Beresford, Elk Point, Jefferson, Sioux City.

For crossing Iowa you are referred to that part of the Woonsocket, S. D., inquiry which gives the routing over the Hawkeye highway. When you get to Shullsburg route to Monroe. It is but a distance of 58 miles from Dubuque to Monroe, which is through the hilly country, but if you are cautious you will have no trouble.

DEMOPOLIS, ALA.—ATLANTA, GA.

Demopolis, Ala.—Editor Motor Age—I would appreciate it if Motor Age would advise me the best route, with names of towns and distances, from Demopolis, Ala., to Atlanta, Ga., and from Atlanta to New York.—H. Simon.

You should go first to Montgomery by way of Selma, which is something like 48 miles. Montgomery to Atlanta is 182 miles and the routing lies through College Point, Palmetto, McCollon, Newman, Moreland, St. Charles, Grantville, Hogansville, LaGrange, Langdale, Glass, Opelika, Auburn and Mt. Meigs.

Atlanta to Greenville, S. C., is over mostly rolling country on dirt roads, with several bad sandy stretches and is a distance of 189 miles, passing through Decatur, Ingleside, Scottdale, Clarkson, Stone Mountain, Snellville, Lawrenceville, Auburn, Winder, Jefferson, Commerce, Pocatallgo, Franklin Springs, Royston, Canon, Bowersville, Lavonia, Anderson, Piedmont, Oak Grove, Oakvale and Greenville. Asheville is a popular summer and winter resort, 60 miles from Greenville, and you might care to pay it a visit by motoring through Tuxedo, Hendersonville, Hillgirt, Fletcher, Arden and Biltmore.

Over macadam roads the greater part of the way, Charlotte, 116 miles distant, is reached via Greer, Duncan, Spartanburg, Converse, Gaffney, Blacksburg, Grover, Kings Mountain, Bessemer City, Gastonia, Lowell and Belmont. Over rolling country you pass 136 miles to Winston-Salem, running through Newell, Concord, Kanapolis, Landis, Chica-

Grove, Salisbury, Spencer, Lexington, Thomasville, High Point, Jamestown, Greensboro, Guilford Battlegrounds, Summerfield, Kernersville and Centerville. At Kernersville you can keep on towards Roanoke through Stokesboro, Ellisboro, Madison, Stoneville, Ridgeway, Martinsville, Oak Level, Syndorville and Rocky Mount.

A good road, either dirt, macadam or stone, takes you to Hagerstown through Cloverdale, Troutville, Buchanan, Natural Bridge, Fancy Hill, Lexington, Timber Ridge, Fairfield, Midway, Greenville, Minto Springs, Staunton, Burkstown, Mt. Crawford, Harrisonburg, New Market, Edinburg, Woodstock, Maurertown, Strasburg, Middletown, Winchester, Martinsburg, Williamsport and Hagerstown. This is a distance of 223 miles and the last 134 miles between Staunton and Hagerstown entails the sum of \$5.50 in tolls, passing through twenty-two tollgates. More toll, in the neighborhood of \$2.50, is required on this road to reach Philadelphia. It is 153 miles and the towns are Waynesboro, Rouzerville, Fairfield, Gettysburg, New Oxford, Abbotstown, York, Wrightsville, Columbia, Lancaster, Williamsstown, Coatesville, Downingtown, Devon, Bryn Mawr and Ardmore.

Leaving Philadelphia, cross the Delaware river to Camden by ferry and thence travel on to Magnolia, Overbrook, Berlin, Hammononton, Egg Harbor City, Pomona, Absecon, Pleasantville and Atlantic City, the prominent summer resort. Retracing the road to Absecon, branch off north through Smithville, Port Republic, New Gretna, Tuckerton, Manahawken, Barnegat, Forked River, Toms River, Lakewood, Burrsville and Point Pleasant, where you follow along the shore through Manasquan, Belmar, Asbury Park, Elberon, Long Branch, Seabright, Highlands, New Mammouth, Keyport, Morgan, South Amboy, Perth Amboy, Rahway, Elizabeth, Newark, Jersey City and ferry across the Hudson river to New York. The mileage from Philadelphia to Atlantic City is 61, thence to New York 152.

In order to take in Washington, D. C., also routing by way of Baltimore to Philadelphia and the shortest route to New York, you would leave the route outlined to Hagerstown at Winchester and pass through Berryville, Leesburg, Martinsburg, Poolsville, Gaithersburg and Rockville to Washington, D. C., 80 miles from Winchester. The most traveled thoroughfare into Baltimore is 44 miles in length and over a fine macadam boulevard most of the way. First you will reach Bladensburg 6 miles out. This small town is famous in American history as a duelling ground, where many duels growing out of quarrels in Washington were fought. Just west of here, at the bridge over the Potomac, the battle with the English which prevented the capture of Washington took place. The road follows on through Hyattsville, Beltsville, Contee, Laurel, Elkridge, Relay, Catonsville and Baltimore. Jones Falls and Federal Hill should be visited while in Baltimore, as well as the numerous monuments.

There is no really good road from Baltimore to Philadelphia, but one to follow would be through Towson, Lock Raven, Glenarm, Fork, Bagley, Belair, Churchville, Earleton, Havre de Grace, which dates back to 1670; Perryville, Northeast, Elkton, Newark, Marshalltown, Wilmington, Chelsea, Village Green, Chester, where the city hall built in 1724 still stands; Norwood, Darby and Philadelphia. At Wilmington will be found the Holy Trinity church, built in 1698, and said to be the oldest building in the United States in continuous use as a church since its erection.

The direct road into New York is 100 miles traveling through Ogontz, Bustleton, La Trappe, Langhorne, Trenton, Princeton, Kingston, New Brunswick, Metuchen, Elizabeth, Newark and the West Forty-second street ferry at Weehawken.



The Readers' Clearing House



DESIGNING COMPRESSION SPACE

Two-Cycle Engines Have Same Compression as Four-Cycle.

S T. LOUIS, MO.—Editor Motor Age—1—What is the formula for determining compression space in four-cycle and two-cycle motors?

2—What is the compression generally used in two-cycle motors?

3—What is the best bore and stroke ratio for two-cycle motors?

4—To what pressure are the gases generally compressed in the crankcase of a two-cycle motor?—St. Louis.

The compression space required by an engine depends upon the compression required. Standard design calls for a compression of 65 pounds per square inch. There are two ranges of positive pressure, known as absolute pressure and indicated pressure. On the first scale, the figures represent the pressure above absolute zero of pressure, while on the latter, they represent pressure above atmospheric pressure. As the atmosphere is under 14.7 pounds pressure to the square inch, there is a difference of approximately 15 pounds in a given pressure on the two scales. In engine practice, for convenience, indicated pressure is taken, 0 being atmospheric pressure, or 14.7 on the absolute scale.

At indicated pressure, assume a cylinder which has a volume of 125 cubic inches. The piston within the cylinder has a displacement of 100 cubic inches. If the pressure, with the piston at the bottom of its stroke is 0, at the top of its stroke, the air in the cylinder will have been compressed to $\frac{1}{4}$ its volume, and the pressure will be five times as great. As the absolute pressure at 0 on the indicator is roughly 15 pounds, the pressure under compression will be five times this amount, or 75 pounds, which is equal to 60 pounds indicated pressure. Thus to obtain a sixty-pound compression, the compression space will have to be one-fourth the piston displacement.

Fig. 1 shows a chart from Kent which may be used for reference. Two curves are shown, the upper one representing the explosion pressure incident to the combustion of gasoline gas at the corresponding compressions on the lower curve. The lower curve represents the pressure. To use this chart for determination of the proportionate volume of the compression chamber to the piston displacement, to obtain a required compression, find the pressure, either absolute or indicated, on the right column, trace the horizontal line to the pressure curve, and follow the vertical intersecting line down to the figures in the bottom column. These will give the ratio of the piston displacement to the compression volume that will be required. To find the explosion pressure that will be

QUESTIONS ANSWERED

St. Louis.....	St. Louis, Mo.
A Subscriber.....	Ranger, Tex.
Loyal Spencer.....	Streator, Ill.
John Davis.....	Lee's Summit, Mo.
L. E. Crandall.....	St. Louis, Mo.
R. F. McArthur.....	Tusla, Okla.
B. O. M. Bonebrake.....	Des Moines, Ia.
Subscriber.....	West Union, Ia.
W. B. L.....	St. Paul, Minn.
C. C. Hahn.....	Wellman, Ia.
E. L. Thornton.....	Benson, Minn.
Earl Price.....	Lodi, Wis.
George McCullough.....	Storm Lake, Ia.
A Subscriber.....	Rantoul, Ill.
L. R. B.....	Los Angeles, Cal.
F. W. Jones.....	Clatonia, Neb.

produced with such a compression, trace upward from the lower curve to the upper.

2—About 60 pounds indicated pressure is usually allowed. Higher compression would be likely to cause pre-ignition in a two-cycle motor.

3—To judge from present practice in design, one would be led to conclude that square motors are preferable in two-cycle design. However, the Koecklin motor, which has been developed in France shows surprising efficiency with a long stroke. There is no reason to believe that long strokes, if favorable to four-stroke motors, should not be equally as advantageous in two-stroke application.

4—Crankcase compression in two-stroke motors varies from 2 to 12 pounds, 5 or 6 being considered preferable. Less than this will make a rapid transfer to the cylinder impossible, while more than this will augment the danger of compression leaks. If a counter-bore is used for primary compression instead of the crankcase, this pressure, with safety and advantage, may be carried higher.

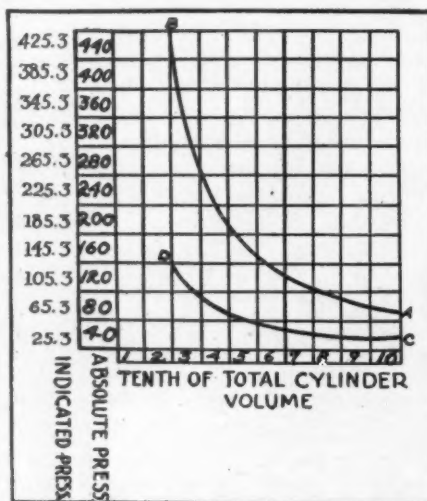


FIG. 1—CHART FOR COMPRESSION CHAMBER DESIGN
Curve A-B, explosion pressure. Curve D-C, Pressure

ON THE FLOODING OF CARBURETERS

High Float Level Causes Overflow and Overheating of Engine

Ranger, Texas—Editor Motor Age—We have a model L Schebler carbureter that we cannot get to stop flooding. It does not flood when the engine is running, but when it stops it begins the overflow. Sometimes it is not more than ten drops, and at other times, it is a steady stream. We have taken it apart, dried the float, and put on a coat of shellac, and tested the float valve for a leak, but it is well seated. As I thought perhaps the float was too high, I lowered it, but it still is no better. I have fixed several the same way and they do not flood.

What is the matter and what would Motor Age suggest doing? It will stop after standing, but when the engine is run awhile and stopped, it has a sucking sound, and then begins to drip. We tried to adjust the carbureter according to the instruction book, and it will not work. Instruction begins by saying to adjust needle-valve by opening $1\frac{1}{2}$ turns. We cannot get the engine to run with less than four full turns, and if over that it quits. Under that, the same result. The adjustment when it came from the factory was four turns open, and intermediate dial stood close to figure 3. The high-speed dial about half-way between 2 and 3. The engine gets rather warm. How can we overcome this difficulty?—A Subscriber.

Flooding usually results from a derangement of the needlevalve of the float or the float lever and its fulcrum. The needle-valve seat must be true and clean, the needle-valve must be sharp and round, and must enter the seat on a true vertical axis. The needle-valve shaft must be straight, and, if fitted with a spring, the spring must be of sufficient tension. Its connection with the float must be properly adjusted and secure. The float must be buoyant and free to float upon the surface of the gasoline. The float lever must be properly connected and must operate freely.

Another cause of the carbureter flooding which may occur with everything in good repair is the carrying of the float level higher than it should be. The jet normally should be above the gasoline level. If the level is carried too high the gasoline will overflow through the jet orifice.

Judging from your recitation of the difficulty, Motor Age would be inclined to believe that the gasoline level is too high. You state that you lowered the float. This would augment rather than remedy the difficulty. You mention the adjustment of the needle-valve. As the needle-valve has nothing whatever to do with the gasoline level you have probably spoiled a good mixture to no purpose. This, we believe is the cause of your engine overheating, as a mixture too lean or too rich will invariably impair the cooling of the engine.

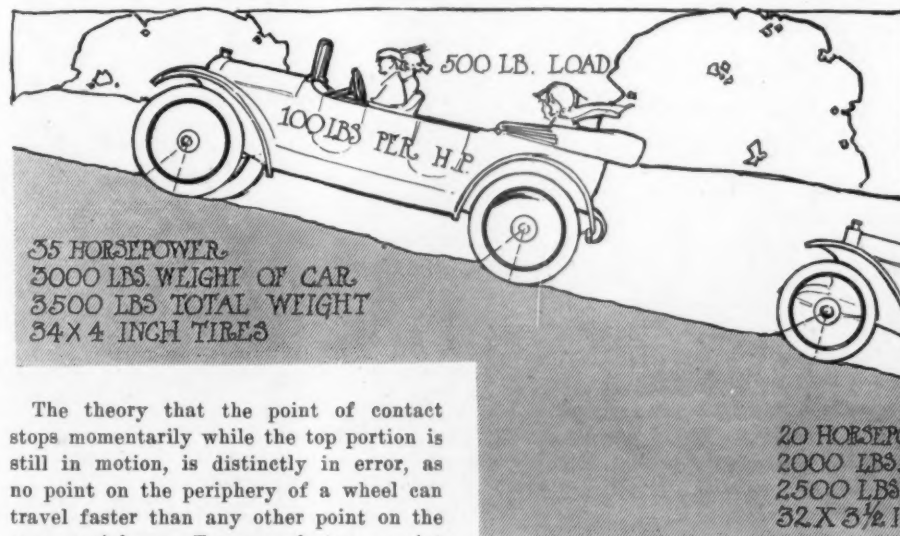
The fact that the carbureter floods at

times, and at times does not, may be accounted for by the fact that the car assumes different angles at different times. If the height of the float level is approximately even with the height of the jet orifice, certain angles may cause the carburetor to flood while others bring the jet orifice slightly above the float level. We believe that with the component parts in good order the raising of the float will lower the level and prevent flooding. A proper adjustment of the carburetor will no doubt insure proper cooling.

OLD WHEEL QUESTION REVIVED

Theory of Speed of Different Parts Is at Fault Apparently

Streator, Ill.—Editor Motor Age—There has been some argument as to what part of a wheel runs the faster, the top or the bottom. Considering that the wheel is driven from the center, such as the rear wheel of a motor car, the argument is that the bottom makes a momentary stop for traction.—Loyal Spencer.



The theory that the point of contact stops momentarily while the top portion is still in motion, is distinctly in error, as no point on the periphery of a wheel can travel faster than any other point on the same periphery. To move faster, a point on the tire would have to move toward or away from some other point on the same tire, which would mean stretching. The tire, felloe and rim of a wheel do not stretch, as there is but one point on the tire where it is held, that being the road contact. It requires purchase at two points to stretch any solid. Considered from the standpoint of speed in relation to the earth itself, it will be found that in rolling on the ground the point of contact is stationary, while the top portion of the tire is moving forward at twice the speed of the vehicle.

To prove this, take a small cardboard disk and affix two strings to opposite points on the periphery. Tie weights to the ends of these strings, and roll the disk on the table. When either of the points comes to the position where it is the point of road contact, it will be observed that the string comes to a full stop, momentarily, while the top portion moves forward at twice the rate at which the wheel as a whole is moving. But these speeds are not periphery speeds. This proves that in relation to the ground, the point of contact is always stationary.

CAUSE OF DETROIT'S SUPREMACY

Why Other Cities Did Not Become the Principal Motor Center

St. Louis, Mo.—Editor Motor Age—As a subscriber and reader of Motor Age I suggest information be given the readers through these columns as to why Detroit and Indianapolis have become the acknowledged centers of the motor car industry. There must be a reason for this, just as there is a reason for Pittsburgh becoming the center of the iron industry, Lowell and Lawrence, Mass., the textile industry, Minneapolis, Minn., the flour-milling industry, etc.—L. E. Crandall.

Centralization of industries as a romance presents many inviting possibilities. Detroit is located in a region where labor is plentiful, close to the producers of the iron and steel that go into the make-up of a motor car, and to the consumers of the finished product. Detroit already was a manufacturing city, and there was a great deal of real estate adapted to manufacturing that was obtainable at reason-

verse conditions which existed in them, that were not found at Detroit and Indianapolis prevented them from assuming the position occupied by the present centers.

Cleveland, St. Louis, and Chicago have much to commend them, but Cleveland has never been prominent as a manufacturing city. It was formerly an important bicycle center, and the White sewing machine interests naturally located their motor car department there. St. Louis was well adapted in many ways, but was too remote from the eastern markets to become of the greatest importance. Chicago seemed admirably adapted, but unfavorable labor conditions prevented manufacturers from choosing Chicago as a location.

CRUDE OIL AS A FUEL FOR MOTORS

Petroleum Cannot be Used Successfully in Gasoline Engines.

Tulsa, Okla.—Editor Motor Age—Can the type of gas engine used in motor cars be run on crude oil? If so, what changes would be necessary to adapt it to this fuel. If not, is there any crude-oil engine on the market that could be adapted to the motor car?

Considering that the Oklahoma crude sells for 83 cents per barrel, while gasoline costs over \$8 per barrel there would be considerable advantage to the oil producer if he could util-

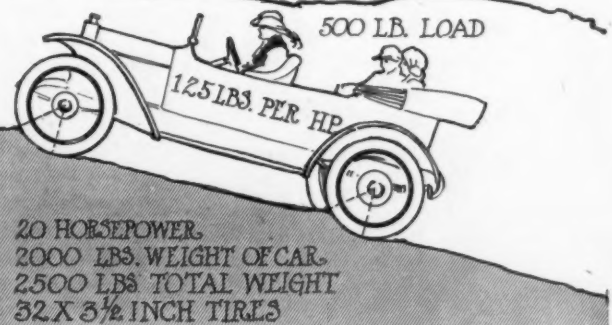


FIG. 2—ANALYSIS OF ABILITY OF TWO CARS, CONSIDERING FOUR FACTORS

able prices. It was noted as a wagon and buggy manufacturing center, and possessed the advantage of good water transportation as well as that by rail.

Indianapolis was the center of the vehicle industry, and it was therefore only natural that it should have assumed a position of prominence in the manufacture of motor cars. Indianapolis is centrally located in an industrial district, and like Detroit had an exceptionally good labor supply due to the number of factories already located there. Another factor that contributed to the selection by many manufacturers of Detroit and Indianapolis for factory location was the broad and progressive policy adopted by the commercial organizations in these cities.

Concessions were granted that larger cities would not have considered necessary, but which smaller centers would not have been able to grant. These two cities seem to be of a size that is best suited to the needs of such an industry. Other cities had equally favorable features to commend them to the motor manufacturers, but ad-

ize the crude, especially for truck work. Then too, in other parts of the country there must be a strong demand for engines suitable for use with cheaper oils. As stationary engines are made to use these cheaper oils, surely there is no reason why they could not be used in a motor car engine built for the purpose. The Oklahoma crude has an average density of 32 degrees Baume. I believe a full discussion of this matter by Motor Age and its readers would be of great interest to many.—R. F. MacArthur.

Crude oil cannot be used in motor car engines. To employ crude oil, a special type of engine must be employed, which is different in principle from the gasoline engine. The most successful crude oil engine developed so far, is the Diesel high-efficiency engine, which has not reached as yet that stage of refinement where it may be made small enough and light enough to be at all practicable as applied to motor cars.

The principle employed in this engine is of compressing pure air in the cylinder to a pressure of about 500 pounds to the square inch. Into this is injected a charge of fuel. The intense heat caused by the high com-

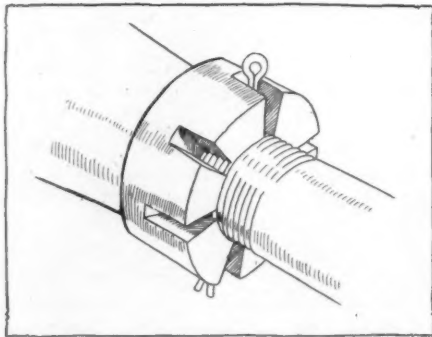


FIG. 3—SUBSTITUTE FOR TROUBLESOME LOCK-NUT

pression ignites the fuel, and the resultant combustion is very complete. Another manner of insuring a complete combustion, and high efficiency is that employed in the Low motor, the product of the efforts of A. M. Low, an English engineer.

This motor employs the fuel as a cooling agent before its introduction into the cylinders. It is reported that Low is developing a form of this motor for use in motor cars, which will go further than the use of crude oil, actually employing pulverized coal. It is admitted, though that the extra size and weight necessitated by the intense pressures generated by the Diesel engine preclude it from consideration in motor car application. Whether Low can build a coal or crude oil motor car engine remains to be seen.

FORD ENGINE AS AIR COMPRESSOR All That Is Possible Is Not Necessarily Profitable

West Union, Ia.—Editor Motor Age—Please advise me if a Ford motor can be used for an air compressor, two cylinders being used for power and for for compressing.—Subscriber.

Yes, but for pressures above 65 pounds per square inch you would need special pistons. Using two cylinders of a four cylinder motor as an air compressor would prove a very inefficient and expensive means of compressing air for any purpose.

MAKING A SINGLE MAGNETO DUAL Gopher Wants Battery Starting Through Magneto Distributor

St. Paul, Minn.—Editor Motor Age—The ignition equipment of my car consists of two separate and distinct systems, a Bosch D R 6 magneto and an Atwater-Kent spark generator. For the last 2 years I have used only the magneto, having disconnected the spark generator, one system being sufficient to care for the operation of the motor and thus doing away with the Atwater-Kent generator.

I am not able to start on the compression with the magneto alone, so I would like to use the coil in conjunction with the magneto as a dual system. Will Motor Age give a diagram of the wiring necessary and state any changes needed on the magneto to accomplish this?

2—In the case of the Atwater-Kent systems, where it is customary to use only dry cells, would there result any injury to the coil if a storage battery was substituted for a set of dry cells of the same voltage?—W. B. L.

1—It is not possible to use a single magneto for dual ignition without certain changes being made in the magneto. These changes will be made by the manu-

facturer at moderate cost. When your single magneto has been dualized, the manufacturer will furnish you, upon request, with a diagram showing the proper connection.

2—Storage batteries may be used in Atwater-Kent systems, provided they are of the right type and capacity. As the Atwater-Kent system is designed for higher voltages than most high-tension systems, the ordinary 6-volt battery will not give the best satisfaction. The liquid type of storage battery of 8-volt 80-amperes capacity has been found the most satisfactory for this purpose, as the liquid type maintains its voltage through a wide range of degrees of charge.

REGARDING MAGNET RECHARGING Westerner Is Interested in Device for the Rehabilitation of Magnetos

Wellman, Ia.—Editor Motor Age—Will Motor Age kindly give full details for the construction of apparatus for recharging magnetos?

2—What is meant by 10,000 ampere turns to the square inch?

3—What kind of insulated wire is used?

4—Are the cast steel top pieces, as shown in Fig. 3, page 36 of the January 25 issue of Motor Age, hardened or tempered?

5—Please give operations for charging.

6—How can one tell when he has the voltage and amperage right for the best magnetizing strength?—C. C. Hahn.

1—This was explained on page 35 of the issue of Motor Age for February 20.

2—Ampere-turns means the number of turns of wire times the number of amperes flowing through the wire. Ten thousand ampere turns per square inch means that the product of the number of turns per square inch times the amperes flowing through that square inch is 10,000.

3—Cotton insulated copper wire.

4—Slightly tempered.

5—Motor Age of February 13, page 52 gives this information.

6—An electromagnet may be operated at any voltage and amperage, but of course this must be within certain limits.

It is not good policy to attempt to make the magnet before determining the current strength to suit it, as it is easier to modify the length and gauge of the wire, and the size of the core than to modify the character of current used. Assuming that you have a 110-volt direct-current lighting circuit, which you desire to use for remagnetizing, select the size of core desired. Assume this to be $\frac{3}{8}$ -inch in diameter, and 4 inches long. The winding should be $\frac{3}{8}$ -inch thick. For 10,000 ampere-turns, 1,000 turns at 10 amperes or 2,000 turns at 5 amperes may be used, according to the resistance and circuit carrying capacity of the wire. Resistance is usually measured in ohms.

Every water pipe has a certain carrying capacity and so every size of wire has a certain carrying capacity. If you send too much water through a pipe the pipe bursts. Too much current through a wire burns it out.

For example, if the voltage is 110 a cer-

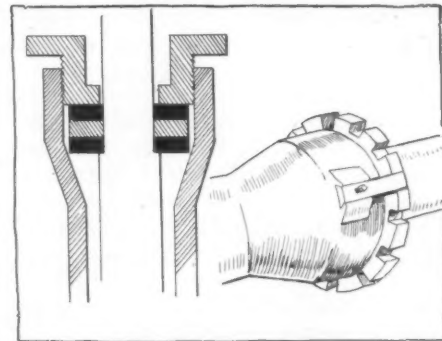


FIG. 4—SUPERIOR LOCKING METHOD

tain current is flowing through the wire; if the voltage is 220 then twice the amount of current will be flowing. It is really current that counts but it is voltage that causes current to flow. Kent's hand book gives the carrying capacities of wires, as does the majority of books on electricity. So, if an electromagnet is to be used in an ordinary lighting circuit, it must be made of wire such as will withstand the voltage of the lighting circuit.

If the voltage at which this current is sent into the coils be too great, the coils will burn up. For example, an electromagnet for a 20-volt circuit would not do for a 500-volt circuit, for it would burn the coils on account of the greater current caused by the increased voltage.

DOES RETREADING OF TIRES PAY?

Small Town Garage Man Hesitates on Tire Repairs

Des Moines, Ia.—Editor Motor Age—Is vulcanizing practical for the motor car dealer in a small town who does not conduct a regular garage or repair shop?

2—What is the general attitude of the large tire manufacturers toward retreading?

3—Is retreading practical for the small town garage or repair shop?—B. O. M. Bonebrake.

1—Yes.

2—The general attitude is that retreading is profitable if it will increase the life of the tire 1 mile for each cent expended.

3—Yes, if there is enough business in sight to pay for the installation of a good equipment and a good tire repairman.

BIG BATTERY FOR BOSCH SYSTEM

Minnesota Reader Wishes to Spark With Lightning Battery

Benson, Minn.—Editor Motor Age—I am using a Bosch dual ignition system on my six-cylinder Winton car. I want to equip the car with a Rushmore lighting system, consisting of a dynamo and storage battery. The storage battery discharges at the rate of 6 to 7 volts, the Bosch ignition system has a 4-volt system. I would like to use the storage battery on my lighting system to spark the engine while starting it.

I am advised by the Bosch company that to use a 6 to 7-volt battery would be likely to burn out the coil armature and also tend to fuse away the platinum contact points. I have been told that there is a way to reduce the voltage by putting in a piece of German silver wire between the storage battery and the coil, but I do not know whether that would reduce the voltage or the amperage and I do not know how much wire to put in. Will Motor Age give me some information on this point.—E. L. Thornton.

To use a resistance in the primary circuit would be a very wasteful means of accomplishing the end you have in view. It would be possible to improvise a wiring that would take current from two cells only of your 6-volt battery, but the trouble that either of these courses would cause would render their value as expedients doubtful. Motor Age would suggest that you dispose of your 4-volt coil, and install one of the new horizontal coils of 6 volts capacity that the Bosch company has introduced especially for combination with lighting systems. The cost to you, including the discount, and the second hand selling price of the old coil should not much exceed \$10.

WANTS DEACO LIGHTING DIAGRAM

Reader Wants Illustration of Electric System on Oakland

Storm Lake, Ia.—Editor Motor Age—Kindly describe and illustrate the Deaco lighting system, such as the Oakland cars for 1913 use. By whom is it made?—George McCullough.

This was described and illustrated in Motor Age, January 30.

A FEW FORD FACTS AND FIGURES

Inquirer is Interested in Features of Small Car

Rantoul, Ill.—What is the bore and stroke of the 1913 Ford car?

2—What is the gear ratio of this car?

3—What is the type of clutch and how does it work?

4—Are there any gears running in the transmission when the engine is running idle?

5—What is the make of the magneto and where is it mounted?

6—What kind of an oiling system does this car have?—A Subscriber.

1—These dimensions are $3\frac{3}{4}$ by 4 inches.

2—The Ford is geared at 4 7/11 to 1, on high.

3—The Ford clutch is of the multiple-disk-in-oil type, operating in the customary manner. It consists of twenty-seven steel disks, thirteen of which are provided with lugs which engage channels in a drum connected with the drive shaft, and fourteen of which are provided with outer lugs which are bolted to the rear plate of the clutch. The driving disks are alternated with the driven disks, so that when the disks are compressed by the spring, the whole set turns as one, transmitting the drive from the drum to the driven shaft.

4—Yes, the gears, especially the small planetary pinions are turning, although the friction bands are not in contact with the friction drums, so that the gears merely run idle.

5—The Ford magneto is of special Ford design, incorporated in the flywheel, and incased. It is in action a low-tension magneto.

6—The Ford oiling system is of the circulating-splash type, circulation being maintained by the flywheel. The cylinders, camshafts, connecting-rod bearings, wrist-

pins, and main bearings are lubricated by splash. The oil level extends back into the flywheel and gearcase. As the flywheel turns, it picks up the oil and carries it up to a cup, above the rear main bearing, through which it flows, returning to the crankcase as overflow.

BENZINE A FUEL FIT FOR BUICK Must Have Good Carburetor, but Will Give Economy

Lodi, Wis.—Editor Motor Age—Can benzine be used as a fuel in a model 29 Buick fitted with a Marvel carburetor taking hot air from the exhaust?

2—What is the price of benzine per gallon? I would also like the name of the company marketing it.

3—Will benzine give as much power as gasoline and is it hard to start the motor in summer with benzine?—Earl Price.

1—Motor Age does not know of any tests on Marvel carburetors in which benzine was used, but as the carburetor is warmed, it is probable that once started,

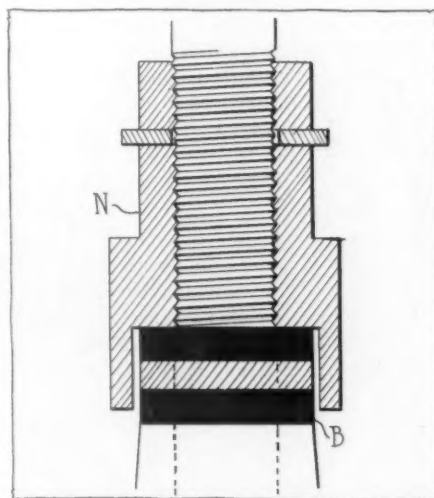


FIG. 5—LOCKING ARRANGEMENT THAT CAUSED TROUBLE

benzine could be used satisfactorily to run the motor. A trial will not be expensive, and would be distinctly interesting.

2—Benzine is quoted at 15 cents in Chicago for the month of February. Benzine may be had of practically all dealers in oil. A few of the most prominent are, the Standard Oil Co., the Texas Co., The Petroleum Products Co., and the Gulf Refining Co.

3—Benzine is a richer fuel than gasoline, and if properly carbureted is said to produce more power. It starts easily in summer, although not so easily as gasoline. In winter it is advisable to use gasoline, or better ether, as a priming fluid on starting.

RETAINING NUT DOES NOT HOLD Thrust Member Causes Trouble for Bear State Motorist

Los Angeles, Cal.—Editor Motor Age—I am inclosing sketch of a thrust bearing on the forward end of the third member of a rear axle which has a tendency to tighten and bind

the motor instead of loosening. The bearing cap and drive shaft have a right-hand thread and the drive shaft runs the same direction as from any right-hand motor. In running on the road this cap will invariably tighten and break the lock washers between the cap and lock-nut. This is on a certain make of axle and every car I have had any dealings with, it is the same. Will you please explain how this is possible?—L. R. B.

According to your drawing, which is reproduced in Fig. 5, with the shaft turning in the direction indicated by the arrow, which is standard for right-hand engines, and the thread a standard right-handed one, as shown, thrust upon the bearing B from the nut N, which normally turns with the shaft, would have a tendency to stop its rotation, turning it up on the shaft so that it would move closer to the lock-nut, and break the lock washer. This is a fault that formerly was common on propeller shafts, but which most manufacturers have met and eradicated by fitting a positive lock instead of a lock nut to their thrust-adjusting nuts.

Such a device is shown in Fig. 4. If the bearing is in proper condition and the adjustment is kept within close limits, so that the surfaces are not strained by sudden impact due to too much play, a lock washer of the right kind should not break when the nut backs up on the lock-nut. A good way to prevent the main nut from backing up on the lock-nut is to castellate it, and remove the lock-nut and washer. Turn the nut up to the proper adjustment and drill the shaft through one of the slots of the nut. Then insert a cotter pin, and you should have no more trouble. If the slots are made deep enough, several turns may be made, employing the same cotter hole. This repair is illustrated in Fig. 3.

WANT NORTHEAST WIRING SYSTEM

Lay-out of Wires in Electric Lighting System Required

Buffalo, N. Y.—I would like an explanation with diagram showing internal and external connections of the Northeast starting and lighting generator system. If possible, show complete wiring diagram.—Anxious.

This was described and illustrated in Motor Age, January 30 issue.

VALVE SIZES INTEREST NEBRASKAN

Picric Acid a Dangerous Explosive and Deleterious to Metals

Clatonia, Neb.—Editor MOTOR AGE: What is the size and lift of valves on Maxwell Model I and Mascot?

2—What size and lift of valves on 60 Overland?

3—Will picric acid attack the cylinder or valves if mixed with gasoline. Will it attack solder or copper?—F. W. Jones.

1—Maxwell model I and Mascot have the same size valves. These are $1\frac{1}{2}$ inches in diameter and have a lift of $\frac{1}{2}$ inch.

2—Two inches in diameter and 13-64 inch lift.

3—Picric acid is detrimental to motor life. It will act on solder and copper as well as iron, and is a dangerous explosive.

House-to-House Electric Delivery

Statistics Showing Operation
by Large Department
Stores

By William B. Stout

TRIPS made on electric delivery wagons in house-to-house delivery show that the C. O. D. package is the greatest nuisance of house-to-house delivery work.

Vehicles operating in the large cities and running from main stores direct to the delivery point without interference are delivering at less cost than those on the sub-station system.

The matter of helpers or delivery boys and their control is worth study in obtaining maximum results from a package vehicle, especially where stops are many and hauls short.

Test Trips in Chicago

Trips were made recently on electric wagons operating for three different Chicago department stores which brought out a number of interesting and important points well worth the study of the man interested in the delivery of packages or small parcels to the ultimate consumer.

Trips were made on trucks running for the Boston Store, Fair and Mandel Brothers in Chicago. The Boston Store truck started from the downtown Chicago store with a fairly long haul before beginning delivery. This machine covered the greatest mileage of any. The Mandel Brothers' vehicle started from a substation adjacent to the delivery territory and so

BOSTON STORE	
TIME ON 22 C.O.D.'s	TIME ON 50 PAIDS.
THE FAIR	
TIME ON 12 C.O.D.'s	TIME ON 47 PAIDS.

COMPARATIVE TIME OF C. O. D. STOPS ON BOSTON STORE AND FAIR DELIVERY TRIPS IN CHICAGO

had but a very short haul to the first stop. The Fair truck had a 3-mile haul to the first stop, less than the Boston, but running from the main store downtown. The figures show the difference between the operation from a point near and from a distant point. Of course it is understood that these are single trips. There may be trucks running from substations making as good or better showings than the one shown through beginning delivery at more distant points from the substation, but the point is that the first haul is a primal item in cost cutting. The Mandel load was exceptionally light on the day in question.

The Boston store is using a 1-year-old vehicle still in fine condition. This is loaded from the sidewalk, with two boys assisting, and has the longest run of any electric at present operating from this store.

On the trip described two boys were taken and these were exceptionally well

controlled by the driver. They would be sent away from the machine with a package to deliver or several packages for several places and they often jumped off without any stoppage of the vehicle. The driver always instructed them as to where to meet him. The two boys were continually on the move and when they were both off and the sorting of packages had been accomplished the driver took a hand, but always taking care to be back in time so that the boys were not left idle on the load.

Boys Carry Change

On C. O. D. parcels the boys were given change to the even dollar for the amount to be received. If above \$3 they were given change for a \$5 bill. The money was collected immediately on the return of the boy.

The boys themselves were interesting, one a plodder who took his work seriously and the other with more humor and quicker with his tongue. Though they

TABLE 1—SHOWING ACTUAL TRIP MADE ON AN ELECTRIC OWNED BY THE BOSTON STORE, CHICAGO

Stop	Delivery	Delay	Number of Packages	Stop	Delivery	Delay	Number of Packages
1	1	30 s.	1 package	21	32		
2	2	1 m.	C.O.D. 1 package	..	33		1 package
3	3	1 m. 30 s.	C.O.D. 1 package	..	34	10 s. (Boy drops off)	3 packages
4	4	1 m.	C.O.D. 1 package	22	..	7 m.	
5	5	10 s.	Boy drops off 1 package	23	35	3 m.	C.O.D. 1 package (ref.)
6	6	1 m.	1 package	24	36	1 m.	1 package
7	7	2 m. 30 s.	C.O.D. 1 package	25	37	4 m.	2 packages
8	8	10 s.	2 packages	26	38	5 m.	1 package
9	9	30 s.	1 package	27	39	4 m.	C.O.D. 1 package (ref.)
10	wait for boy.	4 m.		28	Start Return Trip		
11	11	No. stop.	Boy drops off 1 package	28	40	3 m.	2 packages
12	12	..	1 package	29	41	..	1 package
13	13	4 m.	2 packages	..	42	..	2 packages
14	14	..	1 package	..	43	3 m.	1 package
15	15	Driver delivers 2	3 packages	30	44	..	1 package
16	16	packages while boys	2 packages	..	45	3 m.	1 package (ref.)
17	17	are gone 16 m.	1 package	31	46	30 s.	C.O.D. 1 package
18	18	..	Three C.O.D.'s.	32	47	3 m.	C.O.D. 1 package (ref.)
19	19	..	1 package	33	48	1 m.	C.O.D. 1 package (ref.)
20	20	30 s.	1 package	34	wait for boy..	1 m.	
21	21	..	C.O.D. 4 packages	35	49	1 m.	C.O.D. 2 packages
22	22	5 m.	1 package	36	50	4 m.	C.O.D. 1 package (wrong address)
23	23	5 m.	1 package	37	51	1 m.	1 package
24	24	..	2 packages	38	52	3 m.	C.O.D. 1 package (ref.)
25	25	2 m.	1 package	39	53	4 m.	1 package
26	26	..	1 package	40	54	..	2 packages
27	27	1 m.	3 packages	..	55	5 m.	1 package
28	28	2 m. 30 s.	1 package				
29	29	3 m.	C.O.D. 1 package (ref.)				
30	30	1 m.	C.O.D. 1 package (ref.)				
31	31						

Here current gave out on account of heavy roads and driver phoned for aid

Miles traveled, 18
Deliveries made (packages), 72
Deliveries made (actual), 55
Average delivery stop, 2 minutes 42 seconds
Total stops made, 40.
Average stops per mile, 2.22

Time on C. O. D.'s, 49½ minutes
Percentage of C. O. D.'s in number, 33 per cent
Percentage of time lost on C. O. D.'s, 46
Number packages returned, 13
Percentage returned, 1.8

Total standing time, 1 hour 48 minutes
Total running time, 1 hour 7 minutes
Average packages per stop, 1.8
Average packages per mile, 4
Approximate cost per package, 5 to 6 cents

C. O. D. Package a Big Stumbling Block

BOSTON ELECTRIC	
STANDING	RUNNING
MANDEL BROTHERS	
STANDING	RUNNING
THE FAIR	
STANDING	RUNNING

COMPARATIVE STANDING AND RUNNING TIME ON DELIVERY TRIPS FOR THREE CHICAGO STORES

were equally conscientious, the plodder the more so if anything, it was noted that the boy with the quick tongue almost always was the first back. The boys were about 15 years of age. The trip in detail is shown separate and a study of the tabulation will explain many points of quick service worth noting.

In all the vehicle covered 18 miles, delivering seventy-two packages to fifty-five places with forty stops. The average delivery stop was 2 minutes 42 seconds. The stops per mile were 2.22. Thirteen packages were returned to the store, mostly through the buyers being out or

through no change on C. O. D.'s. The vehicle was standing idle 1 hour 48 minutes during the delivery trip, all told, and was actually in motion 1 hour 25 minutes. Just 1.8 packages were delivered per stop, four packages per mile, at an estimated cost of 4 cents. Thirty-three per cent of the packages were C. O. D.'s, but 46 per cent of the idle time was due to them, 49 minutes 30 seconds in all. Other details will be dealt with later.

Trip Made by Fair Truck

The trip made on the Fair truck, a 1-ton Detroit machine with Edison cells, started from the downtown store and ran

Electric Helps, However, in Delivering the Small Parcels

about 4 miles before the first stop was made. The truck also was loaded at the sidewalk by hand trucks, but only one boy was used. This boy was older than those on the Boston wagon and with a greater realization of the work in hand seemed more efficient than the others.

The machine is one of two which have taken the place of three 2-horse wagons and make an extra trip as well, so that they are really doing the work of more than four two-horse outfits. Loads average about 600 pounds. On this particular trip the car carried fifty packages and left the store at 1:30 p. m. The routine of the trip is shown in table 2.

This trip was on a Saturday when nearly everyone was at home, if not the heads of the families at least the children, and yet the delivery was remarkable in that there were no returns, except for one package that was called for, and all C. O. D.'s were accepted. Other routes show a high percentage of returns, and other days

TABLE 3—TRIP MADE ON ELECTRIC DELIVERY FOR MANDEL BROTHERS

Truck left barn at 1:39.
The trip in detail was as follows:

Stop	Deliv.	Delay m. s.	Number Packages	Distance	Time	Remarks
1	1-3	1 0	3	1-2 mile	1:45	Three parties, one building.
2	4	2 0	1	1-12 mile	1:47	Boy jumps on after car starts.
3	5-8	4 0	13	1-12 mile	1:51	Driver helps deliver.
4	9	2 30	1	1-12 mile	1:56	Crockery requires receipt.
5	10	3 0	1	150 feet	1:57	
6	11	1 0	1	150 feet	1:59	
7	12	0 30	1	1-8 mile	2:01	
8	13	1 30	1	150 feet	2:02	
9	14	1 10	1	150 feet	2:04	
10	15	2 10	1	150 feet	2:06	Crockery.
11	16	1 0	1	150 feet	2:09	
12	17-18	3 0	2	1-4 mile	2:12	Parties out.
13	19	2 0	3	1-10 mile	2:16	
14	20	1 0	1	1-6 mile	2:19	
15	21	2 0	1	1-6 mile	2:24	
16	22	3 0	1	1-6 mile	2:27	C. O. D.
17	23	2 0	1	1-4 mile	2:32	Chicago Beach hotel
18	24	2 0	3	1-4 mile	2:37	
19	25	1 0	2	1-6 mile	2:40	Wrong address
20	26	2 0	2	1-12 mile	2:41	Out.
21	27	1 0	1	1-6 mile	2:43	
22	28-29	4 0	2	1-12 mile	2:47	First and third floors.
23	30	2 0	7	1-12 mile	2:52	
24	31	2 0	1	150 feet	2:57	Out. \$19.75 C. O. D.
25	32	4 0	1	150 feet	2:59	
Back at store, 2 miles away, at						3:10

Same car due to leave on another trip at 4

A. M. trip made 34 stops, 18 deliveries and 16 calls

P. M. trip, 25 stops, 30 deliveries, 51 packages

Miles Traveled—3½	Percentage Returned—.096
Packages Delivered—51	Total Standing Time—50 m.
Deliveries Made, Actual—32	Total Running Time—45 m.
Total Stops Made—25	Packages per Stop—2
Average Time of Stop—2m.	Packages per Mile—14.18
Average Stops per Mile—8½	Approx. Cost per package at
Time on C.O.D.'s—5 min.	\$8.00, 3 trips—\$.052
Percentage of C.O.D.'s—.07	
Number Packages Returned—3	

TABLE 2—ACTUAL TRIP MADE ON ELECTRIC DELIVERY FOR THE FAIR, CHICAGO

Stop	Pkgs. ery.	Deliv. m.	Delay s.	Time	Distance	Remarks
1	1	1	0	1:47	4 miles	Left store at 1:30 1-t
0	1	2	..	1:48	1-6 mile	Detroit Edison battery
2	1	3	1	1:49	1-10 mile	Boy jumps off without
0	1	4	..	1:51	1-10 mile	stop
3	2	5	2	1:53	1-10 mile	
4	1	6	1	1:57	1-4 mile	Pick up boy at 1:55
5	3	7	1	1:59	1-5 mile	Sort packages to 2:01
0	3	8-10	..	2:00	1-4 mile	Boy off 1 C.O.D. Pick
6	4	11, 12	2	2:02	1-5 mile	up boy 2:11
7	1	13	1	2:06	1-4 mile	2 C.O.D., 2 paid
8	1	14	2	2:08	150 feet	
9	1	15	1	2:12	1-5 mile	
10	2	14, 15	2	2:14	150 feet	1 C.O.D.
0	2	16	..	2:17	1-5 mile	Boy off. Pick up at 2:21
11	2	17	2	2:18	1-10 mile	
12	8	18-26	1	2:21	1-5 mile	Boy off. C.O.D. Pick
13	1	27	2	2:23	1-5 mile	up at 2:39
14	2	28, 29	5	2:25	150 feet	C.O.D. Leave 2:30
15	1	30	3	2:31	150 feet	C.O.D.
16	2	31	1	2:36	150 feet	
17				2:38		2 minute stop to shift
18	1	32	1	2:41	1-5 mile	packages
19	2	33, 34	10	2:43	1-10 mile	Hardware store. Return
20	1	35	0	2:54	1-4 mile	package
21	1	36	1	2:56	1-5 mile	
22	7	37-43	1	2:57	1-5 mile	Boy off. Picked up at
23	1	44	3	2:58	1-5 mile	3:13
24	1	45	3	3:02	1-5 mile	C.O.D.
25	1	46	1	3:06	1-5 mile	C.O.D.
26	1	47	1	3:08	1-10 mile	
27	1	48	1	3:10	1-10 mile	
28	1	49	2	3:13	1-5 mile	C.O.D.
29	1	50	1	3:15	1-10 mile	Back at store 3:34
Total Miles—13.5						Number packages returned—
Total Stops—29						per cent
Total Deliveries—50						Total Standing Time—56½ m.
Packages Delivered—50						Total Running Time—67½ m.
Average Time of Stop—						Packages per Stop—2
1 m. 57 s.						Packages per Mile—4½
Average Stops per Mile—2.1						Approx. Cost per Package—4½ c
Time on C.O.D.'s—26 m., 30 s.						Number of Helpers—1
Percentage of C.O.D.'s—20						
Percentage of Time Lost on						
C.O.D.'s—47						
All house-to-house-work						

show the same on this route. Four \$5 bills were changed by the man on the route.

The only long delay of the journey came on delivering a small package to a customer at a small furniture store. In the first place there was no one about the store on arrival. The boy was delivering a package two doors away, and the driver waited in the furniture store 5 minutes after the boy was back from his delivery. The proprietor then came in from a shopping expedition and received the package. A package was to go back to the store from here so the driver had to wait further while the dealer climbed the stairs to his apartments above to get the package. It took 2 minutes more for him to volubly explain the cause of the refusal of the package sent back, making 10 minutes lost to the truck and two men over an 8-cent package.

Several minutes were saved during the journey by the driver being able to set the brake and jump from the machine before it came to a dead stop, as happened many times. This has been a claim made for horse rigs, that the driver did not have to come to a dead stop to start delivery. A ratchet, Fig. 4, on the brake lever did the trick. The total miles covered by the truck on the delivery were 13.5, stops, twenty-nine; deliveries made, fifty, and packages delivered, fifty-nine.

Though fewer than one-fourth of the packages were C. O. D., nearly half the total idle time was taken up in delivering. **Idle Time in Delivering**

The third trip, made on an electric running for Mandel Brothers from a sub-station, differs from the other two in many particulars which are of considerable interest. For this machine the load is brought out from the store on a 3-ton gasoline truck. Arrived at the station, the load—mostly trunks, is dumped onto the

TABLE 4—SHOWING COMPARISON OF DELIVERY TRIPS MADE ON CHICAGO ELECTRICS

	Boston	Mandel	Fair
Miles Traveled.....	18	3.33	13.50
Deliveries Made.....	55	32	50
Packages Delivered.....	72	51	59
Total Running Time.....	1 h. 7 min. 45 min.		67.5
Total Standing Time.....	1 h. 48 min. 50 min.		56.5
Packages per Mile.....	4	14:18	4.33
Packages per Stop.....	1.8	2	2
Total Stops.....	40	25	29
Average Stops per Mile.....	2.22	8.33	2.1
Average Time of Stop.....	2 m. 42 sec.	2 m.	1:57
Per cent time lost on			
C. O. D.'s.....	46		47
Time on C. O. D.'s.....	49.5 m.	7 m.	28.5 m.
Percentage C. O. D.'s.....	33	.07	20
Number Pkgs. Returned.....	13	3	0
Percentage Returned.....	1.8	.096	0
Number of Helpers.....	2	1	1
Approx. cost per package.....	.5c to 6c.	5.2c.	4.5c.

The Boston store electric started from the store with a long trip to the first stop, thus making this good showing. The Fair truck also started from the store but with a shorter run to the first stop. The Mandel truck started from a sub-station and started delivery at once. Hence the higher rate of deliveries per mile, etc. The difference in mileage should be noted in connection with other figures as an explanation of comparisons. Costs were figured high—at \$8 per day per truck with 1 helper and \$9 for the one with 2 helpers, figuring 3 trips a day. The Mandel trip was an exceptionally light one.

sidewalk at which point the drivers of the electrics gather, pick out the trunks labeled with their route number and drag them into a point on the floor inside the barn in front of their vehicle. Here the trunks are opened and a boy takes the packages out, calling out the streets and then tossing them one by one to the driver at the side of the car. The driver sorts them out on the floor in the order of the streets until the trunk or trunks are empty. This done, the trunk is closed and dragged back to the sidewalk to be returned to the store. This takes about 12 minutes. The boy returning, then goes through the packages, calling out addresses and the driver lists them on a board-backed blank as a road-guide later. After this the load is put on in order.

The detailed record of this trip is also shown in a separate tabulation. Only 3.3 miles were covered by the vehicle making thirty-two deliveries of fifty-one packages in all, and twenty-five stops. The average time of stop was 2 minutes, stops per mile 84, total standing time, 50 minutes, and

running time, 45 minutes. Two packages were delivered per stop, and 14.8 per mile, at a cost of about 5 cents per package.

The conditions and surroundings of the trips being known it is interesting to set the figures obtainable side by side as in Table 4, which gives the comparative results of the observations.

The three trips illustrated were taken through territory much the same, the first two being through identical territory.

The small tables show graphically the comparative idle and running times of the vehicles in each case. The Fair electric is the only one of the three which spent more time in motion than standing still.

The Boston truck has the advantage of an 18-mile haul which brings the stops per mile down to 2.22, while the Mandel truck

with its 3.33 mile trip, made over 8 stops per mile.

Although the Mandel truck ran the shorter distance and had but two men on as against three on the Boston wagon, the latter shows an estimated cost of 1 cent per package less. This is mainly due however to the smaller number of packages carried on this particular trip.

Time Lost on C. O. D.'s

The most noticeable thing in connection with the Boston and Fair trips is the high percentage of time taken up by C. O. D. deliveries, while the small number of C. O. D.'s in the Mandel Brothers' trip is also noticed in the comparison.

The trips prove the practicability of the electric car for house-to-house delivery work and emphasize the points where the electric excels. Possibly a small gasoline car could make a good showing on the Boston route, especially if fitted with pneumatic tires, but on trips such as that for Mandel Brothers, where hauls are short and stops frequent, the electric is near ideal.

Thinking Truck Drivers Devise Time-Saving Schemes

Some Are Holdovers from Horse Days Applied to the Motor

IN house to house delivery any scheme which saves time, even though it be but a few seconds on each delivery, is worth a great deal. Many kinks are in use by different drivers to shorten the time of stops, some of the ideas held over from horse vehicle days and some the outcome of new responsibilities of motor vehicles. A few schemes have been noted as seen in the use of various Chicago drivers.

Where a vehicle is making 300 stops a day, a minute saved a stop, means a saving

of 5 hours of truck service a day, no negligible item where cost is concerned.

If a firm is operating five or ten vehicles, negotiable item where cost is concerned is a big factor.

The first result of this desire to save

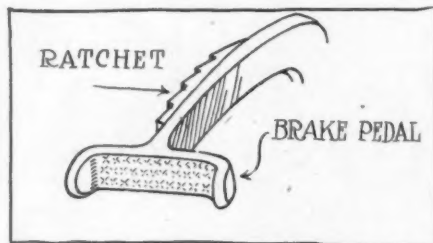


FIG. 4—RATCHET ON BRAKE PEDAL FOR SETTING BRAKE

Package Delivery in Cities Sharpens Wits of Men at the Wheel

seconds has been the elimination of rear doors on delivery vehicles, all packages going into and coming out of the vehicle over the seat. To get off the vehicle, run to the back, unlock and open a door, and a package and then make a delivery is too long a routine for a motor vehicle driver. Packages must be in hand as soon as the vehicle stops and the driver away on his delivery as soon as possible. Several electric delivery vehicles have been noted recently fitted with rear doors which

have been screwed up permanently, having been found impractical.

The bodies of most trucks are too long, however, for the driver to reach all bundles from the seat. This necessitates climbing back and sorting out bundles from time to time, the next bundles to be delivered being generally thrown on the footboard for the boy to take—if there be a helper along.

Saving the Driver

To save climbing back there are several devices in use. One embodies a reconstruction of the interior arrangement of the vehicle with movable sections that can be brought to the front as needed so that all packages can be reached from the seat. A package delivery car was seen recently with a short, rather high body having shelves at the rear so that by a little stretching the driver could reach all packages.

On another vehicle of larger size, where all the packages were the same and any one would do for any customer, these shelves were removable so that the driver emptied one at a time and then folded it out of the way.

One of the most ingenious and at the same time one of the simplest devices was seen in use by a driver for Mandel Brothers, Chicago. Fig. 1. This consisted of a round stick 24 inches long and $\frac{5}{8}$ inch diameter with a hook H in the end held by a brass ferrule F, as in the drawing. With this stick handy the driver could reach any bundle in the wagon, haul it to the front, and have it in hand almost before the vehicle came to a stop.

The stick was one probably picked up somewhere, looking indeed like the handle of an old pop-corn-popper polished by use. The brass ferrule was retained on the end and in place of the wire-basket affair, a common screw hook had been screwed into the end of the piece, this being bent out a little wider than when furnished. As all the packages in the load were well wrapped and tied the device was very successful. Two-thirds of the packages were in box form. The driver stated that he had had this same stick in use for 3 years.

All of the time-saving kinks used on motor vehicles have not been entirely the result of the motor.

Drivers Show Ingenuity

The same driver had two other kinks in use which were good, but before explaining them a description of the route device used by Mandel Brothers will be in order.

This blank is furnished in the form of printed blocks, the sheets filled out being torn off and turned in at the end of each run as a record. These blocks are of fairly thin paper so that some substantial backing is necessary other than the usual single pasteboard back, while protection is needed to keep the sheets from becoming dog-eared in use.

For this purpose a wooden frame as in Fig. 2 is furnished each driver, this frame

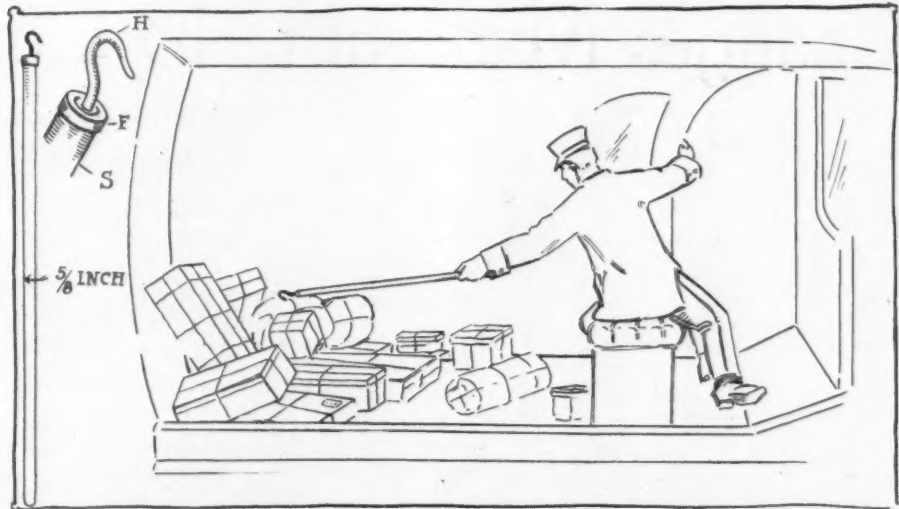


FIG. 1—REACHING BUNDLES WITH HOOKED STICK ON MANDEL ELECTRIC

having a backing of $\frac{1}{2}$ -inch wood and with a slot on the side into which the

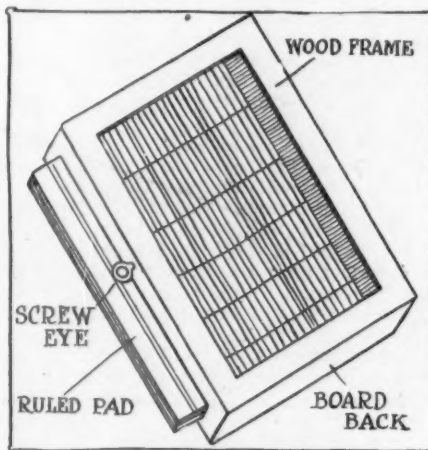


FIG. 2—ROUTE DEVICE

paper pad can be slipped. The drawing shows the blank part way in.

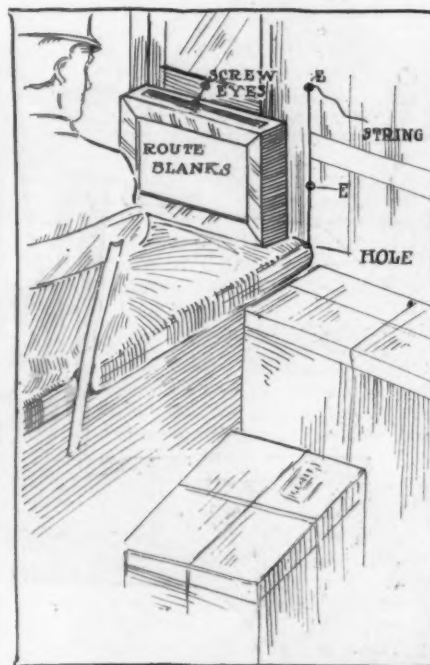


FIG. 3—HOW ROUTE CARD IS HUNG IN CAR AND HOW STRING IS KEPT HANDY

When the packages are being put on to the car at the sub-station the boy helper calls out the addresses of the packages in order after they have been sorted on the floor—that is, in the order in which they will be delivered, as determined by the road route to be followed. As the boy calls off, the driver lists the addresses and packages on the block.

On the road this board then becomes not only a record of the trip and deliveries but a route card which the driver must follow on the streets to make his deliveries in the shortest possible mileage.

The driver mentioned had his route blank frame fitted with a screw eye as shown so that he could hang it up inside the car at a point opposite the seat and thus have his route always before his eye, not having to rely on memory entirely. This saved any roundabout running from forgetfulness. Fig. 3 shows the route card hung in place in sight of the driver.

In the course of deliveries packages often become undone and there are other occasions for having string handy. A ball of string carried under the seat is a continual source of trouble to get at, so that this driver arranged the string through a couple of screw eyes E, E in the side of the car, the string running down through a hole in the seat end to the ball under the seat. In this way the cord was always handy and ready for use.

Device to Set Brake

Another time-saving device was seen on the Detroit electric running for the Fair, Chicago. This consisted of a ratchet device, Fig. 4, on the side of the brake lever as in the drawing, so that the driver could set the brake at any tension and leave it.

In this way when coming to a stop he often would shut off current, set the brake easily and then turning back have the package in hand and be half way out of the car before it came to a dead stop. This device meant a saving of say 5 seconds per stop. This car is making 200 stops a day, saving 17 minutes per day.

Changes Made in 1913 Commercial Cars

ROWE—These trucks of the motor-under-hood type will be marketed in the same form as last year. Six chassis models are being manufactured by the Rowe Motor Co., as follows: 1,500-pound wagon, 1-ton, 1½-ton, 2-ton, 3-ton and 5-ton. The same type of motor is mounted on all of these chassis. This is of the four-cylinder T-head type with cylinders cast in pairs. The bore is 4¼ and the stroke 5½ inches. In design the six chassis are identical, the only marked difference being in the wheelbase and tire size.

Plymouth—Besides the 1 and 2-ton models, which were introduced some time ago, the Plymouth Motor Truck Co. is about to offer two new models of 2 and 3-ton capacity. Though the older Plymouth models have four-cylinder motors, the latest types have six cylinders. In accordance with the principles of the company the new creations have friction transmissions. All Rowe vehicles are of the motor-under-the-seat type, with left steer and left control. The veteran 1-tonner has a four-cylinder motor with cylinders of the L-head type. These have a bore of 4 inches and a stroke of 4¼. The 2-ton car has 4¼ by 5 inches bore and stroke.

Piggins—The only change to be noted in the Piggins line for the coming year is the adoption of the Waukeshaw motor. Piggins

American Made Trucks Show Improvement—Motor Location Subject of Study Part III

trucks are of the motor-under-the-seat type. The noteworthy model is the 1-ton car, because of the fact that it has an external gear drive. The motor of this model is of the L-head type, with cylinders cast in pairs. The bore is 4¼ and the stroke 4¼ inches. The wheelbase is 115 inches.

Sandusky—A 1,500-pound car and a 1½-ton truck, which have not been changed for 1913, are being offered by the Sandusky Auto Parts and Motor Truck Co. The low-capacity car is particularly interesting, for it embodies a number of features. The motor, which is 3¼ by 4 inches bore and stroke, is forward of the car and under a hood of the Renault type. Cylinders are of the L-head type cast in block. The camshaft is driven by helical gear. This model has left steer and center control. The 1½-ton truck has left steer and left control and has the same motor as the 1,500-pound car. A feature of the big truck is the governed-spark control.

Nelson-LeMoon—Three chassis are being offered by the Nelson-LeMoon Truck and Automobile Works. These are 1, 2 and 3-ton capacity. All have Continental motors and Brown-Lipe gearsets. The 1-ton model has single, fixed ignition, while the other models have dual ignition, with hand control. Center control and right steer is characteristic of all three chassis. **Transit**—The changes in the Transit Motor Truck Co.'s 2, 3½ and 5-ton trucks have been in the addition of auxiliary springs and S. A. E. bands on the demountable rims. The 5-ton model has had the tires made larger. The sub-frame motor suspension is continued for

1913 on Transit trucks. All are chain-driven. The 2-tonner has a motor of the block type with cylinders 3¼ by 4¼. The other two chassis have the cylinders cast in pairs. The wheelbase is 144 inches in all cases.

Stegeman—There has been added recently to the Stegeman line of trucks a 1,500-pound car. This makes the line include six distinct chassis. These are of ¼, 1, 2, 3, 4 and 6 tons' capacity. The striking feature of this array of commercial cars is the block motor casting and the automatic spark control.

The 1,500-pound car stands out because of the fact that it has a T-head motor, while the other models have L-head. The small car is the only shaft-driven car of the line and the only one with left steer coupled with center control.

Stearns—The two 5-ton chassis marketed by the F. B. Stearns Co. remain unchanged for the coming year. The only difference between the two chassis, as far as design is concerned, is in the wheelbase. One has a 144-inch wheelbase while the other has 180. Left steel and center control are used. The motor is of the four-cylinder T-head type with cylinders cast separately. These have 4¼ by 6 inches bore and stroke.

King—A short-wheelbased, 3½-ton truck is the product of the A. R. King Mfg. Co. The motor of this car is of the four-cylinder, L-head, cast-in-pairs type. The spiral gear camshaft drive is a feature of the motor. Ignition is by dual system with fixed spark. A gearset of the individual-clutch type is used.

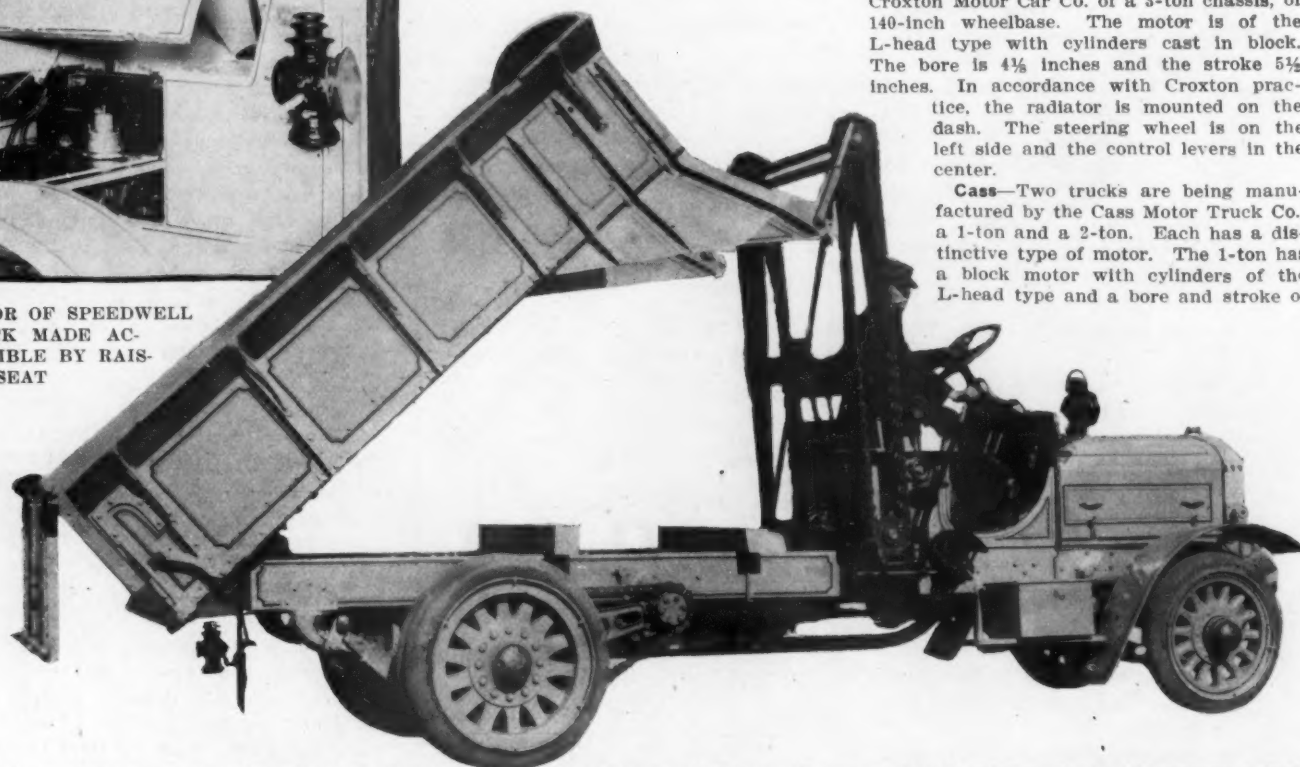
Lange—The 1, 1½ and 2-ton trucks manufactured by the Lange Motor Truck Co. have received no changes for the coming year. The two last named have the same block motor. It has a bore of 4¼ and a stroke of 5¼ inches. The 1-ton car has a block motor with L-head cylinders of 3¼ by 5¼ bore and stroke. The helical camshaft drive is characteristic of all models. The roller drive on the 1-ton and the individual-clutch gearset on all models are worthy of note.

Croxtan—Announcement is made by the Croxtan Motor Car Co. of a 3-ton chassis, of 140-inch wheelbase. The motor is of the L-head type with cylinders cast in block. The bore is 4¼ inches and the stroke 5¼ inches. In accordance with Croxtan practice, the radiator is mounted on the dash. The steering wheel is on the left side and the control levers in the center.

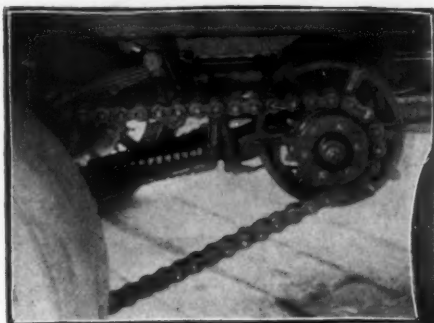
Cass—Two trucks are being manufactured by the Cass Motor Truck Co., a 1-ton and a 2-ton. Each has a distinctive type of motor. The 1-ton has a block motor with cylinders of the L-head type and a bore and stroke of



MOTOR OF SPEEDWELL TRUCK MADE ACCESSIBLE BY RAISING SEAT



VULCAN'S SPECIAL BODY FOR COAL CARRYING AND CONTRACTORS' HAULAGE. DUMP OPERATED BY LEVER FROM DRIVER'S SEAT



JACKSHAFT BRAKE AND SPRING
RADIUS ROD ON VELIE TRUCK

4 by $4\frac{1}{2}$ inches. The 2-tonner has a motor with its four cylinders of the I type cast separately. The 2-ton truck has a disk clutch, while the 1-ton has a cone.

Hart-Kraft—Of the eight chassis manufactured last year, all but the model F are continued for this year. The line of trucks received a number of changes, principally wheelbase changes. The Hart-Kraft D, a $2\frac{1}{2}$ -tonner, is now of 140-inch wheelbase, as against 144 inches in 1912. Model G has been decreased from 116 to 114 inches and the H chassis increased from 130 to 133 inches. The present line consists of cars of capacities as follows: 1,000 pounds, 1,500 pounds, 1 ton, $1\frac{1}{2}$ tons, 2 tons and $2\frac{1}{2}$ tons. The first two named have two-cylinder opposed motors. The rest, with the exception of the $2\frac{1}{2}$ -ton car have block motors. The $2\frac{1}{2}$ -ton chassis has a four-cylinder L-head motor with cylinders cast in pairs. Dual ignition and splash oiling system is common to all the motors.

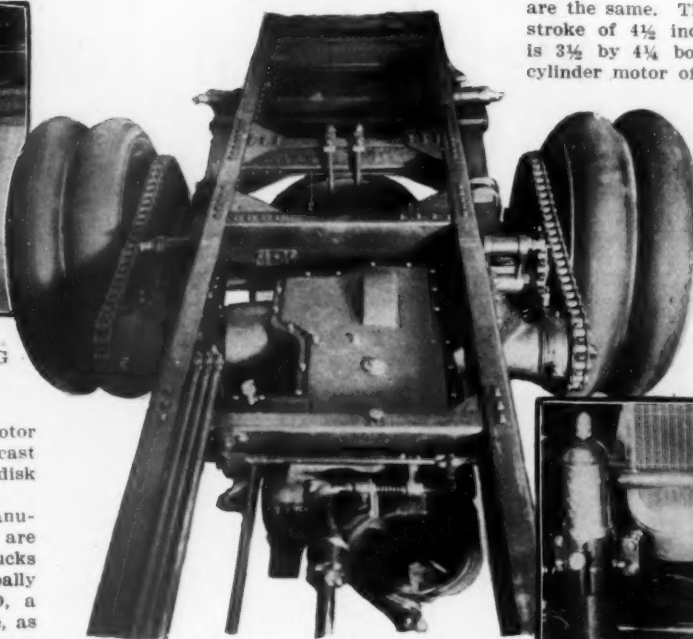
Ford—No changes have been made in the Ford delivery car for this year. The wagon, which has a 100-inch wheelbase, is of 750 pounds' capacity. The motor is a block casting with L-head cylinders of 3 $\frac{1}{2}$ by 4 inches bore and stroke. The planetary gearset used on Ford pleasure cars is part of the delivery chassis. Pneumatic tires 30 by 3 in front and 30 by $3\frac{1}{2}$ in the rear are used.

Day Utility—The wheelbase of the model D, which was known as B in 1912, has been increased from 110 to 115 inches. The four-cylinder motor of 4 by $4\frac{1}{2}$ inches bore and stroke has not been changed. This year sees the Day Utility with left steer and center control. The 1913 product is of 1,500 pounds' capacity.

Cameron—A 1-ton truck has been added to the Cameron family. This differs from the 1-ton car of 1912 as regards gear ratio only. Two 1-tonners are being marketed, with gear ratios respectively of 7 to 1 and 6 to 1. Both cars are chain driven. The 800-pound delivery car has shaft drive. The motor, which is the same in all three chassis, is of the four-cylinder air-cooled type. The bore is 3 $\frac{3}{4}$ inches and the stroke 3 $\frac{1}{2}$ inches.

Wilcox—The manufacturer of Wilcox trucks has made no radical changes since 1912 in the 1, $1\frac{1}{2}$ and 3-ton trucks. As far as design is concerned the three trucks are the same. The 3-ton has a wheelbase of 126 inches and the other two have the same wheelbase—117 inches. The motor in all cases is of the four-cylinder, L-head, cast-in-pairs type. The bore is $4\frac{1}{2}$ and the stroke is $4\frac{1}{2}$ inches, developing 28.9 S. A. E. horsepower. A cone clutch and selective gearset is used to drive side chains to the rear wheels.

Marmon—The Nurdyke & Marmon Co. has invaded the commercial field, having brought out recently a 1,500-pound delivery wagon. The wheelbase of the new Marmon product is 120 inches. The motor is of four cylinders with T-head cylinders cast in pairs. The bore and stroke is 4 by 5 inches respectively. A helical gear is used for driving the cam-



SOLID CONSTRUCTION OF GARFORD
FRAME AND TRANSMISSION UNITS

shaft. A cone clutch is used. The drive is by shaft through bevel gears to a gearset on the rear axle.

Lord Baltimore—For 1913 the Lord Baltimore line consists of 1, 2, 3, 4 and 5-ton chassis as against a single 3-ton car in 1912. The 3-ton model of last year is being marketed with a number of changes. The motor this year has a bore and stroke of 4 $\frac{1}{2}$ by $5\frac{1}{2}$. Last year these dimensions were 4 $\frac{1}{2}$ by 5 $\frac{1}{4}$. The hand spark control of previous years has been discarded and the governed control is now in use on the 3-tonner.

The 1 and 2-ton cars have the same motor. This is a block casting of the L-head type. The cylinder bore is 3 $\frac{3}{4}$ inches and the stroke 5 inches. The 2-ton and 3-ton models have T-head motors with cylinders cast in pairs. The 5-ton car has a motor with a bore of 5 $\frac{1}{2}$ inches and a 7-inch stroke. The 1-ton and 2-ton vehicles have left steer and center control, while the rest of the line has right steer and right control. An internal gear drive is used on the first two named cars. The others are driven by side chains.

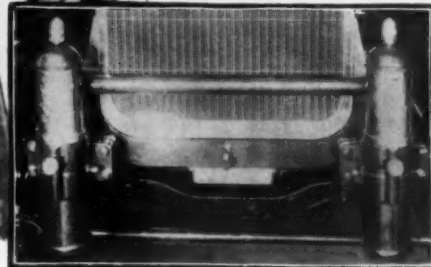
Seitz—Five chassis are being manufactured by the Seitz company, a 1,500-pound wagon, together with trucks of capacities as follows: 1, 2, 3 and 5 tons. All are friction driven to a jackshaft and thence by side chains to the rear wheels. The 5-ton truck has a four-cylinder motor of the T-head type with cylinders cast in pairs. The remaining four chassis have L-head motors of four cylinders.

Best—The 1,000-pound Best delivery car is being marketed this year without change, but the 1-ton truck also manufactured is a new model recently put out. The 1,000-pound affair has a motor of the two-cylinder opposed type with a bore of $4\frac{1}{2}$ and a stroke of $4\frac{1}{2}$ inches. It is friction-driven with side chains to the rear wheels. The new model has a block motor with cylinders of 3 $\frac{3}{4}$ -inch bore and $4\frac{1}{2}$ -inch stroke. It is driven by shaft and through bevel gears to the rear axle. Best cars have left steer. The older model has left control, while the 1-ton vehicle has center control.

Lambert—Increase in the size of the brake bands and side chains are two changes to be noted in Lambert trucks for 1913. The line consists of a 1,500-pound, a 1-ton and a 2-ton chassis. In accordance with former Lambert practice these trucks are friction driven. The motors of the 1 and 2-ton cars

are the same. This has a bore of $4\frac{1}{2}$ and a stroke of $4\frac{1}{2}$ inches. The 1,500-pound car is 3 $\frac{1}{2}$ by $4\frac{1}{2}$ bore and stroke. The four-cylinder motor of the 1 and 2-ton cars is a block casting of the L-head type. The 1,500-pound wagon has the motor cylinders cast in pairs.

Decatur—A single chassis is being marketed by the Decatur company. Mounted upon this truck is a four-cylinder block motor, of the L-head type. The bore is 3 $\frac{3}{4}$ inches and the stroke $5\frac{1}{4}$, develop-



WESTINGHOUSE SHOCK ABSORBER AS
APPLIED TO A WALTER-LATIL MODEL

ing 22.5 S. A. E. horsepower. The wheelbase is 120 inches.

Couple Gear—Oddities in commercial car construction are being marketed by the Couple-Gear Freight-Wheel Co. These cars are driven on all four wheels. Both front and rear axles are live. Three differentials are used, one on each live axle and a third common to both is situated between the two. The motive power is obtained from a four-cylinder motor $5\frac{1}{4}$ by 6 inches bore and stroke, in the case of the 3 $\frac{1}{2}$ -ton truck. A 5-tonner, manufactured also by this company, has a four-cylinder motor with a bore of 5 $\frac{1}{2}$ and a stroke of 6 inches. Both chassis have the same design of motor, although the dimensions are different. This is of the T-head type with cylinders cast separately. Fixed ignition is used. The 3 $\frac{1}{2}$ -ton car has 36x4 tires all around and the 5-tonner 36 by 5. Control is by pedal instead of the conventional lever. The Couple-Gear Freight-Wheel Co. is manufacturing trucks also, of the gas-electric power plant type. In these a gasoline engine operates a dynamo, which furnishes current for four motors, one at each wheel. The drive from the motors to the wheels is by direct internal gear.

Jarvis—Three chassis models are offered by the Jarvis Motor Truck Co. for 1913. The line consists of a 2, 3 $\frac{1}{2}$ and a 5-ton chassis. A motor of four cylinders with 4-inch bore and 6-inch stroke is used on all models. The cylinders are of the I-type and cast separately. All have three-speed selective gearset, with side-chain drive to the rear wheels.

Kato—A single 3-ton car is being offered under the name of Kato. It is in the same form this year as in previous years. This is one of the few big cars that is driven by shaft and bevel gears. The motor of the Kato is of the four-cylinder type with L-head cylinders cast in pairs. The bore and stroke is 4 $\frac{1}{2}$ by 5 inches. The rear spring is of the platform type. Single ignition is used.

Nyberg—The 1 $\frac{1}{2}$ -ton Nyberg chassis, the only truck of the line, has received no important changes for the coming year. The feature of the car is the center control. The motor is of the block type with L-head cylinders of 3 $\frac{3}{4}$ by $5\frac{1}{4}$ bore and stroke. Drive is by side chains from a jackshaft to the rear wheels, by means of a disk clutch and three-speed selective gearset.



The Motorist's Kindergarten



EDITOR'S NOTE—Motor Age is publishing in this department a series of non-technical explanations of the various parts of motor cars for the benefit of the reader who knows nothing about them. The subjects will be dealt with in the most elementary manner, so that the series when completed will form a simple elucidation of the car. The first article appeared October 10, 1912.

IGNITING the compressed gas in the cylinder is accomplished usually by the use of a spark plug. When the gas engine was in its early stages of development the spark plug was unknown, so some other means of igniting the gas had to be used. A flame was the heat producing agent. This flame burned continually below a disk. The disk had a slit in it. As the disk rotated and the slit passed the flame, the latter shot into the cylinder. This was one way, but between the time it was employed and today, many forms of gas-igniting systems were used. We are chiefly interested in the modern forms of igniting the compressed gas in the cylinders of an engine.

There are two types of ignition systems in use today, the make-and-break and the jump-spark. The former is used largely on motor boats and stationary engines, while the jump-spark is the common form and is in use on every make of motor car as well as a number of marine engines.

Everyone knows that when a wire or circuit that is carrying electricity, is suddenly broken a spark is seen. In other words when an electric circuit is broken and the voltage happens to be high enough, as it is in the case of a gas engine, a spark occurs. The make-and-break system depends upon this. The circuit is made and broken and every time the circuit is broken a spark occurs. It is arranged so that the circuit will be broken just when the spark is needed. However, the jump-spark system concerns us chiefly,

Spark-Plug Construction

because it is in use more than is any other system.

When the words jump-spark are mentioned it means that the spark jumps across an air gap. Why does it jump? Because the current flowing through the circuit is of high voltage. Imagine water flowing through a pipe at an exceedingly high pressure, say 10,000 pounds per square inch. Two feet from the end of the pipe there is a receptacle for catching the water. Why does the water jump through the air a distance of 2 feet? Because the pressure is so great that gravity has no chance to draw it toward the earth. The same thing happens in a spark plug. An air gap is provided and the current being under a high voltage, usually 3,500 volts, the spark jumps across the gap. Hence the name jump-spark. In Fig. 41 are shown the parts of an ordinary spark plug. E is the insulator, which is made of porcelain, mica, stone or similar substance. D is the body or shell of the plug. A is the metal electrode, which is made of platinum alloy, meteor wire or other material that will not wear out quickly when heated. C is the collar which contains asbestos gaskets. B is the thumbnut which holds the high-tension wire to the plug. Only one electrode is shown in the parts, for the other is part of the metal shell.

The electrode, A, fits into the insulator, E, and the latter is placed in the shell.

The collar then is slipped over the insulator and screwed into the shell. The collar is used to hold the insulator in place as well as retain compression. The thumbnut screws into the top of the electrode.

The current is led to the thumbnut from which it passes to the electrode and as shown by the arrow in Fig. 41; the current goes through the electrode. When it gets to the bottom there is but one place for it to go and that is across the air gap M, in order to get to the other electrode.

As soon as it jumps across it creates a spark which ignites the gas in the cylinder. But the shell is screwed into the cylinder. Hence the cylinder receives the current. It travels along the side of the cylinder and to a place that brings it back quickly to the place where it is generated. This place is the ground wire. The current is generated in the high-tension coil and must return there in order to complete the circuit. One end of the high-tension coil is grounded while the other end goes to the spark plug. The circuit then, is from the high-tension coil, through the spark plug, to be ground wire and back to the high-tension coil.

Often a spark plug will not work properly. This may be due a number of things. Sometimes the distance between the two electrodes is too great. The high-tension current that is led to the plug is not able to jump such a big gap and the result is that no spark occurs. Take the water pipe, mentioned in a previous paragraph. The water was able to leap across a space 2 feet long, but if the space were increased to 10 feet the water would drop to the ground. So with the spark; it cannot jump a big gap. However, the electrodes are too close together, sometimes. This causes a spark to occur, but so small that its heat is not sufficient to ignite the gas in the cylinders.

So it remains to have the points just far enough apart, so that a spark will jump across that is hot enough to ignite the gas. Another cause of poor sparking is due to a short-circuited spark plug. Carbon is the result of the combustion of the gas in the cylinders. Should this element deposit itself between the two electrodes the current will flow through the carbon, thereby causing no spark to occur. It is just like having one continuous wire running through the plug to have carbon between the electrodes.

The heat of the cylinder sometimes causes the points or electrodes of the spark plug to spread, thus preventing the current from jumping across.

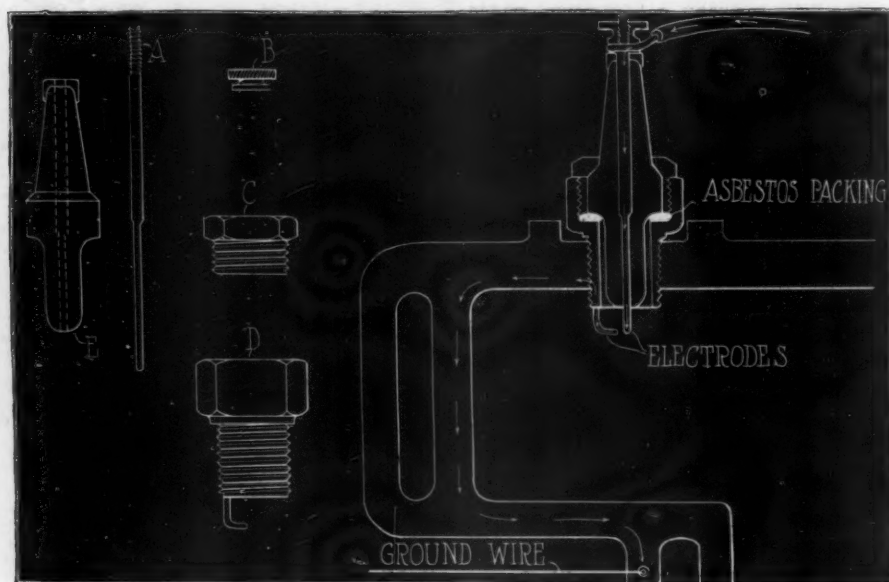


FIG. 41—PRINCIPAL PARTS OF ORDINARY SPARK PLUG. THE PATH OF THE HIGH-TENSION CURRENT THROUGH THE PLUG SHOWN BY ARROWS

Manufacturers' Communications

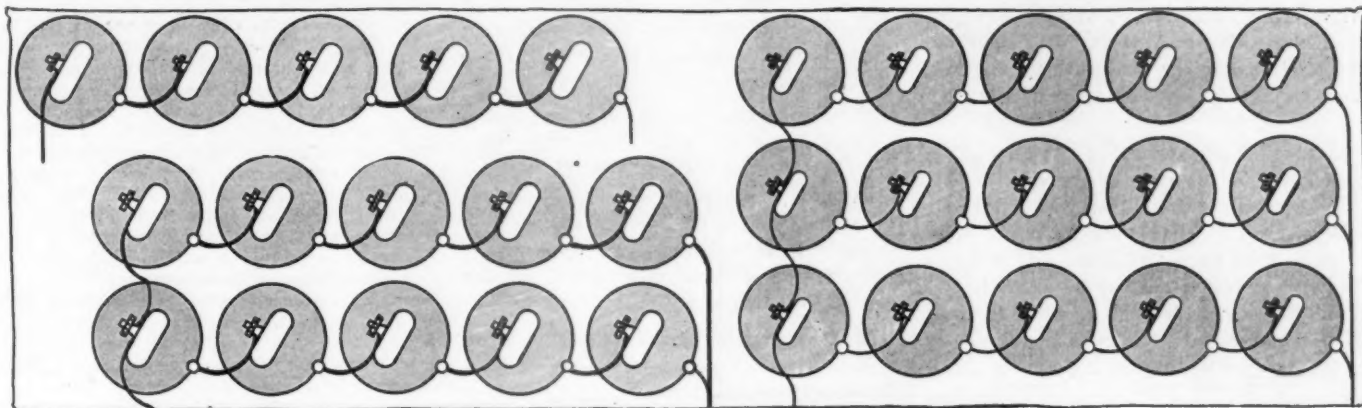


FIG. 1—FIVE CELLS IN SERIES

FIG. 2—TEN CELLS IN SERIES-MULTIPLE

FIG. 3—FIFTEEN CELLS IN SERIES MULTIPLE GIVING FOUR TIMES THE LIFE OF THE FIVE CONNECTED AS IN FIG. 1.

Multiple Battery Connections for Economy in Dry Cells

EDITOR Motor Age—An answer to an inquiry on dry cell operation given on page 39 of the November 21, 1912, issue of the Motor Age led us to write the following notes on the economy of the multiple battery. We often find that in explaining the reason for connecting cells in multiple series, mention of obtaining a low rate discharge per cell is very seldom given. It is really more economical to connect new cells in multiple series when the occasion demands it than to wait until the cells are worn out before doing this.

In order to operate the different types of ignition systems successfully a certain number of dry cells connected in series is necessary to obtain the proper voltage. By dividing the voltage recommended by the different coil manufacturers for their respective coils by 1.2, the approximate number of cells to be placed in series can be determined easily. For convenience, it will be assumed that five cells connected in series, which is a very common combination, are used, Fig. 1.

Sometimes it is found that when a single set of five cells in series is connected to an

ignition system that too frequent renewal is necessary. Dry cells will operate best where the current is only required at intervals for a short length of time or when only a low current is drawn from them continuously. The intermittent service or low rate discharge allows more complete depolarization of the dry cell, thus giving more economic operation. For ignition work it is often necessary for the battery to operate continuously for a great length of time and in order to get the best results a low rate discharge per cell is desirable. The object of connecting sets similar to the one shown in Fig. 1 in multiple, is to obtain a low rate discharge per cell. When two sets of five cells in series are connected in multiple as in Fig. 2 the current drain per set is divided by 2, and likewise the current drain is divided by 3 when three sets are connected as in Fig. 3, etc. This low rate discharge or light current drain permits the cells to recuperate during service and results in much longer service life.

To illustrate the gain in service life of batteries by the use of the multiple ar-

range the following table is given which represents data obtained from practical engine tests, using a different number of sets having five cells connected in series.:

Arrangement of cells	Units of service
1 set of 5 in series.....	100
2 sets of 5 in series-multiple.....	250
3 sets of 5 in series-multiple.....	400

In obtaining these figures a four-cylinder, four-cycle motor car, engine speeded at 20 miles an hour was used. The engine was equipped with a standard commercial vibrating coil. After batteries were installed they were required to run day and night without stopping until the engine began missing.

This table is given more to show the relative life rather than the actual life. The actual life of any of the combinations given would be much longer than indicated, as in no case would the service be as severe as that imposed upon the cells in this case. The cells in ordinary practice have an opportunity to rest while the engine is not running. This rest would also tend to increase the life of the batteries. —National Carbon Co.

Board of Trade Handbook

THE "Handbook of Gasoline Automobiles for 1913" is just off the press. This publication is the tenth annual announcement of the Automobile Board of Trade, formerly the Association of Licensed Automobile Manufacturers. This book contains 173 illustrations of the leading models of manufacturers holding membership in the Board of Trade. With the illustrations are specifications clearly describing the various models. One hundred and forty-six pages are given over to pleasure cars and twenty-seven pages to gasoline trucks. In order to render easy comparison between different makes there is used a uniform style of specification.



Another satisfactory feature is an item stating just what equipment is included in the list price of each car.

This should prove of benefit to those to whom the item of equipment is an important consideration, because the practice among manufacturers varies considerably in this regard.

The "Handbook of Gasoline Automobiles for 1913" is from the presses of Clarkson

& Reed, with offices in the United States Rubber Co. building, New York.

Hoo's Hoo, Wats Wat

Hoo's Hoo, Wats Wat, by Henry Caldwell, is one of the most brilliantly written and entertaining books, made up of short biographical sketches on the leaders of the motor industry, that has appeared to date. Mr. Caldwell is a wit of national fame and his familiarity with the various members of the industry has well fitted him for the work. Fifty-six pages are given over to this work, in which he has treated not only the members of the various manufacturing establishments but many others prominent in the industry. It is from the press of Eaton & Ettinger, New York.

PERUVIANS Set Speed Limit—A speed limit of 15 miles per hour has been made by a recent ordinance in Lima, Peru. The number of motor cars in the Peruvian capital is increasing rapidly.

Motorists Welcomed—The Waseca Anti-Horse-Thief Association, at its forty-fifth annual meeting at Waseca, Minn., decided to admit motor car owners to membership and to assist them in recovering stolen cars.

Lights Bungalow with Battery—New and novel use of a motor car storage battery is reported from Hartford, Conn. A motorist who spends his summers in a bungalow on Cape Cod asserts he uses the battery to run a number of small lights. He says the scheme has worked out so well that others are doing the same thing.

Would Tax by Weight—A bill is being prepared in Toronto, Ont., covering the licensing of motor vehicles, which, if carried, would completely reorganize the present system of taxation now in operation. The bill suggests a scale of weights and rates as follows: Thirty cents per 100 pounds up to 2,000 pounds in weight, 40 cents per 100 pounds on cars up to 4,000 pounds and 50 cents per 100 pounds on cars over 4,000 pounds. The money received from this new form of licensing would be turned into a fund for distribution among the counties, to be used for good roads in the different communities.

Amending Milwaukee's Tax Laws—An ordinance requiring the proper recording of distances traveled and the time consumed in waiting for passengers and providing for the inspection and approving of the devices twice a year by the official city sealer of weights and measures is before the Milwaukee common council as an amendment to the present ordinances governing the use and operation of taxicabs. The section relating to inspection instructs the city sealer's force to examine and inspect such taximeters, and every wheel, tire, gear, shaft and every part of the mechanism which may affect or control the operation of such taximeter. If passed, an expert motor car man will be added to the sealer's force.

To Shorten Savannah Course—If the recommendation of the sub-course committee of the Savannah Automobile Club is adopted, by the committee of the whole, the grand prize and Vanderbilt cup races will be run over a 12-mile course next November. The new plan provides for a circuit that is 5 miles shorter than the one over which the last two big races were run, and has the additional advantage of making it unnecessary for the county to build any additional roads. A few turns will have to be banked and some new surfacing and mending done. The course that has been tentatively selected is made up of the following roads: The cars will start in front of the grandstand on Waters avenue, as heretofore, and will run out to the Montgomery crossroad; then out on the

From the

Montgomery crossroad to Sandfly; from Roche avenue; then to the Skidaway road; over the Skidaway road to Dale avenue; then down the homestretch back to the starting point on Waters avenue.

Uruguay Aroused—The successful operation of motor buses in Montevideo, Uruguay, has caused a most favorable impression. An appropriation of \$350,000 has been made by the government for the purchase of more vehicles of this type, which will run on regular schedules from the capital to points in the interior.

To Duplicate Morgan's Raid—Plans are under way to duplicate, with motor cars, General Morgan's famous raid in Ohio a half century ago. The invasion is to be a peaceable one. Four men who participated are to go over the route, traveling in motor cars. Bishop David H. Moore, of Indianapolis, Ind., formerly of the Ohio conference, is one; Dick Morgan, a brother of General John H. Morgan, another; General Duke and Colonel Coleman. Coleman, a former confederate, took Moore prisoner just before Morgan himself was captured.

New Englanders Repenting—The places in New England where barriers were raised against motor cars are dwindling into nothingness now. Up in Maine the legislature has been asked to change the law so that Bar Harbor may be thrown open to motorists. At a meeting in that town the other day the vote for allowing motorists to enter was very large, and it went so far as to allow them to use all the roads on the island, instead of restricting them to a few. On top of that comes Nantucket, with its special law made by the legislature relative to motor vehicles, and in the town warrant to be acted upon at the spring meeting is an article to allow the operation of motor vehicles on the island.

Recent Club News

THE Automobile Club of Syracuse, N. Y., cites the following record of its activities during 1912 and maintains that it has kept up the good pace: Instrumental in purchase of Cicero toll road; conducted campaign in interest of good roads bonds issue; secured 140 miles of new state and county highway; opposed unreasonable legislation; assisted commissioner of public safety in drafting city traffic laws; aided police in enforcement of traffic laws; placed over 750 warning and guide signs and prepared specifications for 250 more; urged improvement of city streets and bridges; routed over 5,000 tourists; efficiently served 1,100 members; conducted annual outing for orphans; held four sociability and instructive runs; took active part in carnival parade.

The North Dakota division of the Meridian Road Association has re-elected former Governor E. Y. Saries as president and C. W. Graves, Grand Forks, as secretary. Vice-presidents were chosen as follows: M. L. Elken, Mayville; W. H. Kelsey, Grand Forks; D. C. Moore, Grafton; R. S. Lewis, Fargo; E. L. Kinley, Wahpeton.

W. E. Brown was elected president of the Oneida Motor Club, Rhinelander, Wis., at the annual meeting. C. P. Crosby was elected vice-president and C. A. Conro was re-elected secretary and treasurer. The club voted an appropriation of \$200 to cover effort to induce the state highway commission to place Rhinelander on the proposed cross-state highway to be constructed from Milwaukee to Ashland.

At the first annual meeting of the Twin City-Aberdeen Yellowstone Park Trail Association at Miles City, Mont., officers were elected as follows: President, J. E. Prindle, Ismay, Mont.; vice-presidents, J. W. Parmley of Ipswich, S. D., and G. A. Will of Minneapolis; secretary-treasurer, F. A. Finch, Lemmon, S. D. The association will meet next year in Minneapolis. The organization is to fix definitely the route of the national tourist highway from the Twin Cities to the Yellowstone park by way of Aberdeen, S. D., to concentrate efforts on improving the road and fill gaps.

Some Examples of How



MIXING SAND AND CLAY WITH DIRT HARROW IN FLORIDA

Four Winds

Good Roads Brevities

S. A. SEARLE of Omaha, an advocate of practical and scientific highway improvement, has made arrangements in connection with the secretary of the Nebraska State Automobile Association to give an illustrated lecture, touching on all the various phases of road conditions and possible improvement. These lectures will be embodied in a Chautauqua course during the coming summer, and the entire state of Nebraska will be treated to this higher course in the good roads education.

The Whitefish Bay toll road, leading north from the city of Milwaukee, Wis., along Lake Michigan, has been purchased by Milwaukee county for \$15,000. The road is about 3 miles long, and leads to Whitefish Bay, a summer resort. The road will be improved by the county. More than 4,500 motor cars passed through the toll gate every season, at a cost of 10 cents, or 15 cents for the round trip.

That the Ontario government is seriously considering the construction of a road from Kenora to the Manitoba boundary to be the nucleus of the transcontinental highway, seems to be an assured fact. The first exploration party in connection with the new highway has just completed its work and arrived at Ingolf at the Manitoba boundary.

The first step towards raising by direct taxation a public road fund, which will reach \$10,000,000 in the next 2 years, was taken in the house of representatives at Olympia, Washington. The measure passed fixes the road levy at 1½ mills. This will net approximately \$3,000,000. There is already \$1,000,000 unexpended in the state highway fund, making a total of \$4,000,000 in the fund to be appropriated by the present legislature.

It has been decided by the state administration that the codification of the road laws of Ohio will not be pushed in the present session of the Ohio legislature, but will be presented at the extra session to be called later on. A commission will be named by the governor to prepare the bill and have it ready for introduction in the next session. A number of other good roads measures will come up at the extra session of the assembly.

Good Roads Are Made

To do this would mean a change in the state law, and it is too late to get such a one passed by the legislature except by unanimous consent this year.

Ohio Passes Weiser Bill—The Ohio senate has enacted a law, styled the Weiser bill, which validates road-improvement contracts which cover twenty-five counties and comprise hundreds of miles of improvement. The supreme court annulled the Garret law, which by implication invalidated the road contracts. The passage of the Weiser law will remedy the difficulty.

Minneapolis May Limit Loads—A plan to limit the weight of the load of tractors on the streets of Minneapolis is under way. A salesman boasted to the council committee which plans to buy trucks to haul garbage that his demonstrator had hauled a 15-ton load over Minneapolis streets. The city engineer's department is discussing the danger of a load of that size, especially in the spring, on sand cushion creosote block pavement. It was decided tentatively that a 10-ton weight is the maximum, and the assistant city engineer is not sure that the limit is not too high.

Twin City Comparisons—Statistics prepared by H. A. Stuart, statistician for Minneapolis, show comparative motor car figures for the Twin Cities, for final reports ending December 3, 1912. Owned by private individuals and business concerns in Minneapolis there were 5,939 cars, or an average of one machine for every fifty-four persons. In St. Paul there were 2,251 cars, or an average of one to every 101 persons. At an average valuation of \$1,500 for each machine, the Minneapolis investment was \$9,000,000 and the St. Paul figures \$3,400,000. Allowing traveling space of 100 feet to each car, Mr. Stuart figures the Minneapolis machines would

form a procession of 112 miles in length and the St. Paul cars of 42 miles. The city assessor's record showed 4,719 cars in Minneapolis, May 1, 1912.

Alabama Law Sustained—A recent decree of the supreme court of Alabama sustains the constitutionality of the state motor tax. Inspectors have been sent to all parts of the state to see that the law is complied with. While the tax law was in the courts no prosecutions were made against those who refused to pay licenses.

Motor Trucks Hauling Ore—A gasoline motor truck and trailers have been shipped to the Wilbert mine, near Arco, in the mountains north of Pocatello, Idaho, to take the place of 126 head of horses, twenty-one wagons and twenty-one drivers in the transportation of ore from the mine to the railroad loading stations. There is a prospect of installing motor trucks for ore-hauling purposes throughout the Mackay and Custer districts.

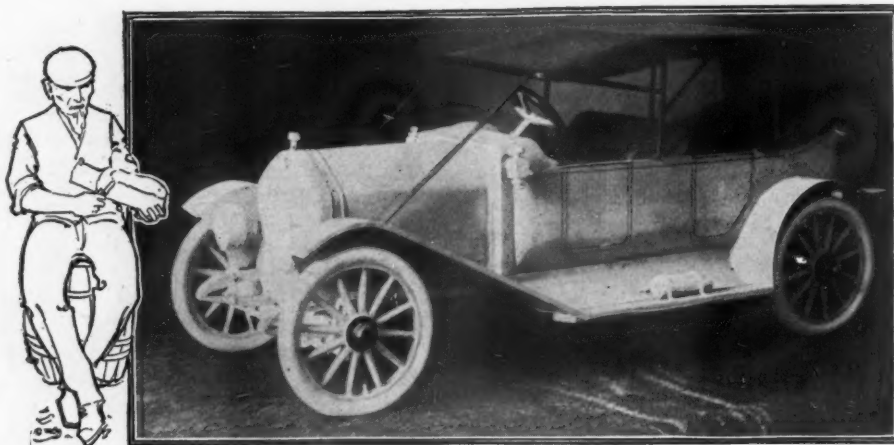
Little Glidden Route Changed—The route of the little Glidden, the annual sociability and reliability run of Iowa motorists, will be changed for 1913 and will start at Davenport, according to the announcement of President Decker French of the Iowa State Automobile Association. The run will take place during June or July and will last 1 week, touching the four corners of the state and visiting many new points of interest that have not been on the itinerary in former years.

Saves Sheriff's Office Money—A motor car, purchased last fall for the use of the sheriff of Will county, Illinois, will pay for itself in 2 years, besides providing a valuable adjunct to the sheriff's office in making prompt service when the officers respond to call from various sections of the county. Insane patients are now hauled to the asylum at Kankakee in the car, instead of going by railroad. During January, the cost of transporting patients by motor car was \$7.75. The same haul via railroad would have cost the county \$80.25. Previous to the purchase of the car, the county averaged \$50 monthly in rentals of cars from private garages. The county is consequently saved about \$100 each month.

Hunt Deer in Motor Truck—Deer hunting by motor truck is the latest novelty introduced into the sportsman line. Percy Willis, Federal distributor in Waco, Texas, with six of his friends, took a Federal truck and traversed some of the worst roads in the wilds of Texas to the deer regions in the mountains. The trip was made in one-fourth of the time that it took to make it the preceding year, as heretofore spring wagons and horses were employed in conveying the outfit. The truck was loaded with about 1,500 pounds of provisions and supplies, together with the tents and necessary equipment, and carried seven passengers. The trip lasted 5 days and the party netted a total of fifteen deer and were sorry they could not take more back, but the game law allows only two deer to a man.



CULVERT CONSTRUCTION NEAR NEOSHO, MO.



Here's an example of perseverance and motoring enthusiasm. It is an illustration of a miniature car, a Buick, which was carved out of wood with a pocket knife, assisted by a pair of pliers. Henry Sitterle of Victoria, Texas, is the man who made the car

Among Makers and Dealers

RECEIVER for Starter Company—On a petition recently filed by M. E. Zepp, an employe of the company, Fred Ropke, an attorney, has been appointed receiver for the Roth-Murphy Engine Starter Co., Indianapolis.

Gauge Concern Changes Name—To accommodate the rapid expansion of the business of the National Gauge and Register Co., La Crosse, Wis., a new factory is to be erected. The name has been changed to Hans Motor Equipment Co., and the stock was placed at \$150,000. Eighty-five men are employed. The new factory will have 20,000 square feet floor space.

Novel Garage Planned—Drs. W. B. Burns and J. F. Austin, leading dentists of Tacoma, Wash., have recently let the contract for a garage, 50 by 120 feet. A feature of the building will be the private stalls or compartments, which will line the full length of the building. These stalls will have outside doors and a 25-foot outside drive the entire length of the building. In this way it is provided that the motorist keeping his car in the garage can enter or leave at any time of day or night. There will be two stories, with a driveway to the upper story from the alley.

Maxwell Activities—The Maxwell Motor Co., Inc., is gradually getting its affairs in shape and squared away for the active manufacture of the several models which have been announced. The general offices at Warren and Woodward streets, Detroit, are being fitted out and will soon become the pulse of the big concern. The Brush plant is now running and will be devoted to the exclusive manufacture of the Maxwell 25. Equipment is being brushed up and machinery added here. At the Alden-Sampson plant, which has been more or less inactive since the reorganization proceedings were begun, all is activity again and trucks are being manufactured. The

plant at Dayton, O., is operating at full force and is to turn out model 35. The Flanders plant also is busily engaged in the production of several models.

Spring Company Increases Stock—The Mather Spring Co., of Toledo, has increased its capital stock from \$100,000 to \$300,000, the purpose being to increase the capacity of the plant. The present plant will be doubled and the 300 tons per month capacity will be doubled.

Opening Week for Columbus—The Columbus Automobile Trades Association, of Columbus, O., a new organization of dealers, is not daunted by the abandonment of the proposed Columbus show, but is making preparations for an opening week March 10 to 15, in which many of the dealers of the Buckeye capital will participate.

New Building for Swinehart—The announcement is made by the Swinehart Tire and Rubber Co., Akron, O., that a new factory building will be erected which will almost treble its output during the coming year. The contracts for the building have been let and the work will start soon. The structure will be 102 by 70 feet and three stories in height. The rumor that the company may remove its plant to some new location in Akron, in order to give it room to expand, was confirmed by President Walsh, who said that the company contemplated such action. The entire three floors of the new building will be given over to the manufacture of pneumatic tires

for motor cars and motorcycles. Mr. Walsh denies the rumor that a movement is on foot to consolidate with another rubber concern of Akron.

Latest Findlay Angle—The recent sale of the Findlay Motor Co. plant to W. W. Edwards, for \$50,000, now turns out to be for Mrs. L. E. Ewing, of Cleveland, wife of the original promoter of the company. Mr. Ewing is on the ground, endeavoring to dispose of the property.

Capitalization Increased—The Bowling Green Motor Car Co., of Bowling Green, O., manufacturers of light motor trucks, has increased its capitalization. The new \$100,000 issue will be \$75,000 in 7 per cent preferred and \$25,000 common stock. The money will be spent in increasing the capacity of the plant.

Frost Company Expands—The Frost Engine Co., manufacturing gasoline motors in several types, has purchased acreage adjoining its present holdings in Evansville, Wis., and will erect several manufacturing buildings in the spring. At the annual meeting a dividend was declared, but it was voted to turn the dividend into the treasury to take care of the proposed expansion. George L. Pullen was re-elected president and Frank Frost continues as secretary and general manager.

Shows Business Sagacity—Fay C. Adams, of Ira Station, N. Y., formerly station agent there, indulged in the selling of eggs to the farmers as a side line. A year ago he bought a motor car to facilitate the delivery of the eggs. Then he quit the railroad and secured the Ford agency for Ira Station, Cato and Sterling. He sold seventeen cars last season, and expects to dispose of fifty during 1913. Meanwhile he has vastly increased his egg market. He buys the eggs from the farmers and sells them motor cars.

New Rambler Office Building—A new office building to accommodate the rapidly increasing administrative force of the Thomas B. Jeffery Co. is now nearing completion at the Kenosha works. The building is 183 feet long and 50 feet wide, with two floors. It is constructed of vitrified paving brick, has concrete floors and is equipped with a complete sprinkler system. At the north end of the first floor will be a show room, 50 by 56. The interior finish will be in oak, with tile floor, and the second floor will accommodate the officers of the company and other administrative departments.

New Wisconsin Venture—The Hoff Motor Co. is being organized at La Crosse, Wis., by Joseph E. and August H. Hofweber, and will be incorporated with a capital stock of \$1,000,000, to manufacture motor cars. The Hofwebers will build and market a pleasure car, under the name of Hoff, designed by them to list at \$790. The first model was built by the Hofwebers at Detroit. The intention of the organizers of the new corporation is to build twenty specimen cars at Detroit immediately upon the perfection of the organization, and as soon

OBITUARY

GEORGE BURNEY ALDRICH, general manager of the Dayton Auto Truck Co., of Dayton, O., died at his home in that city, at the age of 35 years. His death followed an illness dating since last August. He leaves a wife and son, Edwin.

as the business resulting from the use and demonstration of the twenty cars justifies it, a large factory will be erected at La Crosse.

Portland Again Leads—Once again Portland, Ore., leads the northwestern cities in the increased volume of motor car business. The fourth semi-annual report of R. G. Dun & Co. shows that Portland's motor car sales of 1912 were 125 per cent greater than during 1911.

New Aluminum Foundry—A new aluminum foundry, which will make a specialty of castings for the motor car and engine trade, now is being established at Waukesha, Wis., by Conrad Werra, of Manitowoc, Wis., until now general manager of the Aluminum Castings Co. of America's Manitowoc works. Mr. Werra has organized the Werra Aluminum Co. of Waukesha and incorporated it for \$110,000.

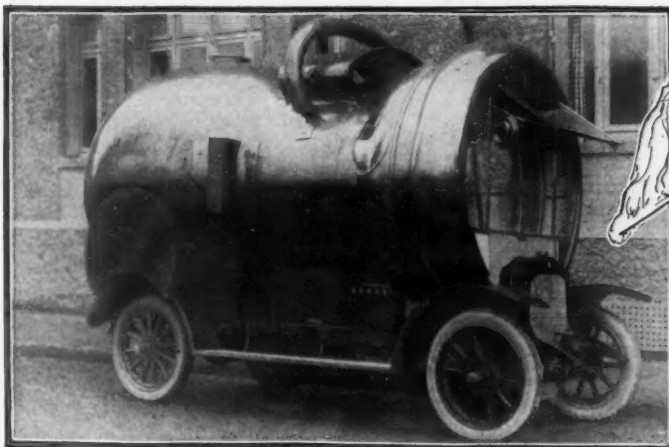
Tire Company Elects Officers—The election of officers for the newly organized Panama Rubber Co. of California was held, with the following result: W. D. Newerf, president; W. E. McCune, first vice-president; Motley H. Flint, second vice-president; J. S. Benner, secretary, and John F. Roe, treasurer.

Gold Medal for Pullman—The Pullman Motor Car Co., of York, Pa., has received the third annual gold medal from the Russian government for Pullman cars entered in the recent government exhibition. The show included all makes of cars made and sold in Russia. The medal was awarded for beauty of design, workmanship, speed, endurance and economy maintenance.

Oshkosh Dealers Organize—The Oshkosh Automobile Dealers' Association has been incorporated under the laws of Wisconsin, with a capital stock of \$1,000, divided into 100 shares, to "conduct a wholesale and retail business in motor vehicles, to promote and conduct exhibitions of motor cars and other motor vehicles, etc." Dr. J. A. Crum has been elected president of the new corporation. The other officers are: Vice-president, F. S. Hoaglin; secretary, Arthur Thom; treasurer, W. F. Scoular.

Splitdorf Invading Europe—O. J. Rohde, treasurer and general manager of the Splitdorf Electrical Co. of New York, has sailed for Europe for the purpose of perfecting the Splitdorf service policy abroad. Mr. Rohde took with him a corps of experts on magnetos, coils and ignition in general, and they will be established in Europe, with London as a headquarters, to attend to the wants of users of American cars on the other side.

Columbus to Motorize—A request has been made by Chief Lauer, of the Columbus, O., fire department, for \$130,000, with which to complete the work of motorizing the fire department. Chief Lauer submitted a statement in which it was shown that the reduction in the upkeep expense of the motor-driven apparatus has been reduced over \$1,000 in the past 3 months. Taking that as a basis, Chief Lauer figures



This illustration shows what is claimed to be the largest motor car lamp in the world. It is in the form of a delivery body on a de Dion-Bouton chassis and is in daily service on the streets of Paris, where it attracts considerable attention because of its odd shape

Recent Incorporations

Amesbury, Mass.—Walker, Wells Co., capital stock, \$25,000; to manufacture motor car bodies; incorporators, H. P. Wells, J. H. Walker, H. Miller.

Bangor, Me.—Penobscot Garage Co., capital stock, \$10,000; incorporators, A. J. Shorey, C. H. Shorey, C. D. Shorey.

Boston, Mass.—W. C. Bates Co., capital stock, \$10,000; incorporators, W. C. Bates, W. J. Munday, G. A. Kersley.

Brooklyn, N. Y.—Caton Garage, capital stock, \$10,000; incorporators, C. O. W. Hoagland, John Carlson.

Brooklyn, N. Y.—Cumberland Garage Co., capital stock, \$50,000; incorporators, W. L. Gray, A. Wilmarth, M. F. Wilmarth.

Chicago—Stafford Illuminated Auto Lamp & Number Co., capital stock, \$50,000; incorporators, R. S. Stafford, W. Doran, F. W. Schaub Co.

Chicago—Logan Square Auto Supply Co., capital stock, \$10,000; to manufacture supplies; incorporators, O. Schmidt, A. J. Schmidt, M. Perl.

Chicago—Perfection Storage Battery Co., capital stock, \$2,500; to deal in storage batteries and accessories; incorporators, E. O. Briggs, R. B. Higbee, W. R. Fetzner.

Chicago—Lacy Motor Livery Co., capital stock, \$10,000; to conduct garage and deal in motor cars; incorporators, H. Decker, F. H. Lacy, S. J. Richman.

Cleveland, O.—National Garage Co., capital stock, \$20,000; to operate garage and trucking business; incorporators, J. A. Mally, C. A. Gardner, G. L. Williams, R. D. Morgan, E. G. Mally.

Columbus, O.—Auto Protective Association, capital stock, \$5,000; to guard owners against theft; incorporators, W. Lester, M. A. Capute, R. M. Switzer, H. L. Richards, A. M. O'Hara.

Denver, Colo.—International Filter Co., capital stock, \$100,000; to make gasoline filters for motor cars; incorporators, J. N. Stewart, H. W. Kirby.

East Orange, N. J.—Norwood Garage; capital stock, \$10,000; incorporators, W. C. Jacobs, D. R. Davies, L. Boehme.

El Paso, Tex.—Longwell Automobile Truck & Sales Co., capital stock, \$10,000; incorporators, J. J. Longwell, H. M. Andreas, J. A. Tays.

Galveston, Tex.—Longwell Automobile Truck & Sales Co., capital stock, \$10,000; incorporators, J. J. Longwell, H. H. Andreas, J. A. Tays.

Hartford, Conn.—Hartford Auto Pump & Supply Co., capital stock, \$50,000; incorporators, H. F. Schale, E. E. Tryon, L. Lockwood.

Jacksonville, Fla.—Gallatin Motor Co., capital stock, \$10,000; incorporators, H. B. Phillips, H. T. Phillips, H. Botts.

Lima, O.—Gladwill Crossley Motor Co., capital stock, \$10,000; to deal in motor cars and sporting goods; incorporators, A. J. Gladwill, C. E. Crossley, F. N. Holland, H. J. Bland, J. W. Roby.

Lynchburg, Va.—Sterling Electric Co., capital stock, \$5,000; to engage in electric supply busi-

ness; incorporators, A. N. Carroll, J. C. Oakes, E. B. Templeton.

Newark, N. J.—Puncture Cure Sales Co., capital stock, \$50,000; to manufacture devices for repairing tires; incorporators, F. B. Stewart, H. F. Kirk, C. H. Stewart.

New Castle, Va.—Craig Transfer & Motor Car Co., capital stock, \$5,000; incorporators, W. W. Johnson, J. P. Jones.

New York—Willits Service Co., capital stock, \$50,000; incorporators, W. C. Willits, M. Jurgensen, E. M. Naylor.

New York—K-E-W Mfg. Co., capital stock, \$5,000; incorporators, J. Jacobs, W. W. Ward, J. A. Bednarik.

New York—E. C. Pardee, capital stock, \$65,000; to manufacture motors; incorporators, K. T. Frederick, C. R. Dewey, L. F. Sniffin.

New York—No Shock Wheel Co., capital stock, \$400,000; to deal in motor cars, tires and parts; incorporators, J. W. Ebbs, R. H. Waddell, A. A. Kelley.

New York—Auto Centre, capital stock, \$25,000; incorporators, E. W. Forster, C. H. Fuller, B. C. Thomas.

New York—Norwalk Motor Car Co., capital stock, \$35,000; incorporators, P. I. Bryce, A. L. Kirby, B. S. Murphy.

Peru, Ind.—Peru Tire & Rubber Co., capital stock, \$25,000; to deal in tires; incorporators, K. E. Miller, O. J. Tillet, I. H. Stanter, L. Miller.

Petersburg, Va.—Virginia Motor & Machine Co., capital stock, \$10,000; incorporators, W. E. Wells, C. F. Denton, J. R. Andrews.

Philadelphia, Pa.—Franco-American Safety Tire Co., capital stock, \$100,000; to engage in tire business; incorporators, F. R. Hansell, George Martin, S. C. Seymour.

Providence, R. I.—Lister, Smith & Walsh Co., capital stock, \$50,000; motor car business; incorporators, J. J. Lister, H. R. Smith, W. R. Walsh.

Providence, R. I.—Savoie Tire Co., capital stock, \$100,000; to deal in motor cars and tires; incorporators, J. Savoie, E. C. Cline, H. D. Reed.

Rochester, N. Y.—Central Motor Supply Co., capital stock, \$20,000; incorporators, F. B. Barager, R. F. Close, W. Wood.

San Benito, Tex.—Whittlesley Garage & Machine Co., capital stock, \$25,000; incorporators, C. W. Whittlesley, James T. Valentine, J. F. Valentine.

Saratoga Springs, N. Y.—Ross-Ketchum Co., capital stock, \$18,400; motor car business; incorporators, J. A. Ketchum, N. B. Ross, J. W. Northrup.

Waynesboro, Va.—Waynesboro Automobile Co., capital stock, \$15,000; motor car business; incorporators, B. E. Watson, J. B. Young, H. M. Hanger.

Wilmington, Del.—Lewis Motor & Engineering Co., capital stock, \$200,000; incorporators, G. D. Hopkins, G. W. Dillman, S. M. Crawl.

Worcester, Mass.—Overland-Winton Sales Co., capital stock, \$10,000; incorporators, G. F. Fuller, H. T. Pierpont, J. Clark, Jr.

that the saving in maintaining motor apparatus over horse-drawn would pay the interest and sinking fund charges on the cost of motorizing the department.

Holland Joins Detroit Electric—The Anderson Electric Car Co., manufacturer of the Detroit electric, announces the appoint-

ment of Walter E. Holland as manager of its mechanical and electrical research department.

Moscovics Back in Old Job—F. E. Moscovics, formerly Remy sales manager, has returned to the employ of Wyckoff, Church & Partridge, of New York.

New Distinctive Shapes Featured in the

THIS year marks the coming of distinctive radiator shapes. The V-shaped radiator which met with approval abroad is to be seen on the Abbott-Detroit, Knox and Oakland cars. However, the fact an uncommon radiator has appeared is the incentive to further work along this line. With this in mind a D-front radiator has been brought out by the Jackson company. There has always been a desire on the part of the manufacturers of motor cars to equip their products with radiators unlike any other on the market, so that the car may be pointed out as being distinctive.

In adopting these oddities appearance alone has not been uppermost in the minds of the makers, although a radiator not of the conventional flat type will attract attention. Greater efficiency is claimed for the V-shaped for its cooling surface is greater than that of a flat radiator of equal carrying capacity. Owing to its construction the V-type offers less resistance to the wind and hence does not cut down speed as much as a flat radiator.

Aside from outer appearance the internal construction of the radiator is to be given consideration, for in reality a well-shaped radiator poorly constructed is not desired as much as a finely made and poorly designed one.

Distinguishing Radiator Types

There are two distinct types of radiators on the American market—tubular and cellular, but owing to the fact that the tubular is made to appear sometimes like a cellular, confusion is evident. The term honeycomb should be synonymous with cellular.

The distinguishing feature of the cellular radiator is that in it the water may take any path that gravity dictates, while in the tubular the water is made to take a definite path.

Often a tubular type is called a cellular owing to its outside appearance resembling a honeycomb. The arrangement of the water spaces and the tubes of the tubular

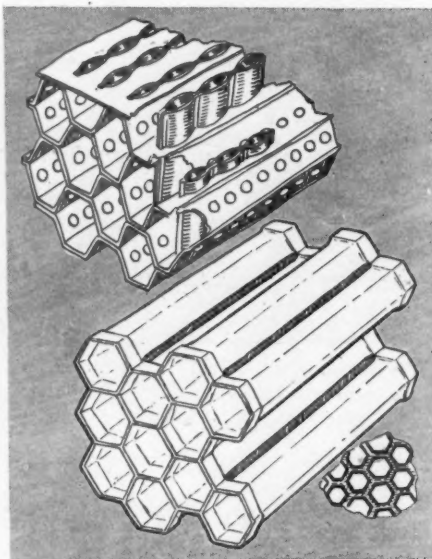


FIG. 1—AT THE BOTTOM CELLULAR TYPE, AT TOP TUBULAR

radiators may be made in an infinite number of ways. In Fig. 2 a type of tubular radiator which looks like cellular is shown. The true tubular is also illustrated and it will be noticed that the vertical tubes have attached to them fins. These fins are designed to absorb the heat of the water. In the cellular appearing types, which are, strictly speaking, tubular radiators, thin sheets of metal arranged in a variety of forms transmit the heat of the water to the outer air.

In the cellular type shown in Fig. 1, the water may take any course it desires around the horizontal tubes. That is, there is no definite path set for the water to follow. It comes in at the top of the radiator and flows downward and at the same time around the tubes in any direction whatever. The air circulating through the tubes takes the heat away from the water. The tubular radiator is easily repaired and cheaper than the cellular.

McCord—Although no radical changes

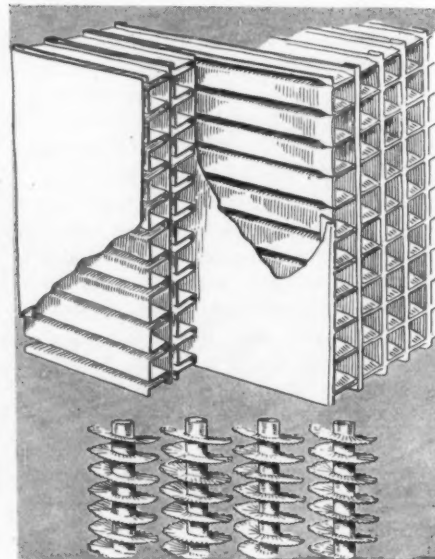


FIG. 2—ZIG-ZAG TUBULAR. AT BOTTOM TUBULAR WITH SPIRAL FINS

have been made this year, McCord radiators have been finished to a finer degree of excellence. The tubes of one type are made of brass, $\frac{1}{4}$ inch in diameter. Soldered to them are horizontal copper fins. These fins absorb the heat from the water passing through the tubes. The reason copper is used for fin material is because that metal is a great absorber of heat and will give it up readily to the air. Another type consists of a number of vertical metallic strips, pressed into $\frac{1}{4}$ -inch squares. These long strips are separated by flat strips. The water circulates vertically and through the pockets made by crimping the metal.

The McCord company has paid special attention to the manufacture of radiators intended for use on engines that are cooled by the thermo-syphon system. Since this system requires no pump for the circulation of water a special type of radiator adds greatly to the motor's efficiency.

Long—The Long Mfg. Co. offer a number of types and designs of radiators, for the coming year, including the V-shaped. In all cases the appearance has been improved and in the case of the cellular types the edges of the water tubes have been flattened to 1-8 inch. This allows extra protection to the tube. The cells of this type are square, each side being of the same thickness. Rigidity of construction has been looked after in the manufacture of these radiators. The Long company manufactures also radiators for commercial vehicles and tractors. These are of the flat-tube, honeycomb, or spiral-tube type and have been made lighter for the coming year. The tubing used in the Long products is seamless and the points of contact with the ribbon or crimp wound around is made to fit perfectly.

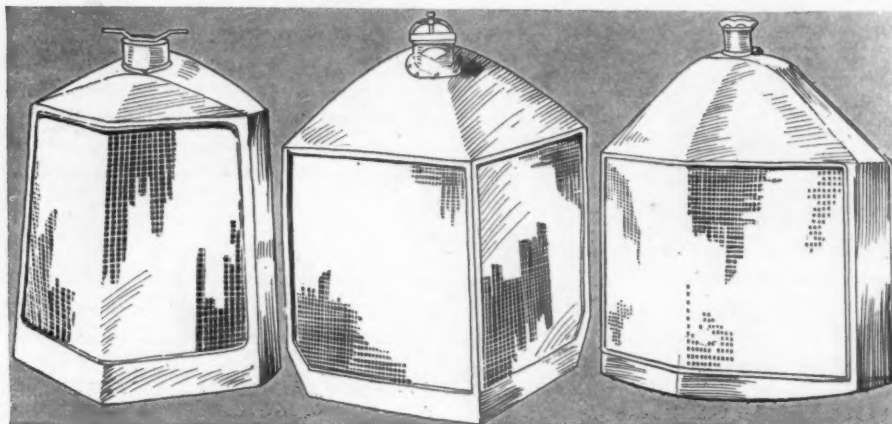


FIG. 3—THREE STYLES OF V-SHAPED RADIATORS, LONG, FEDDERS, KNOX

Field of Radiators for Season of 1913

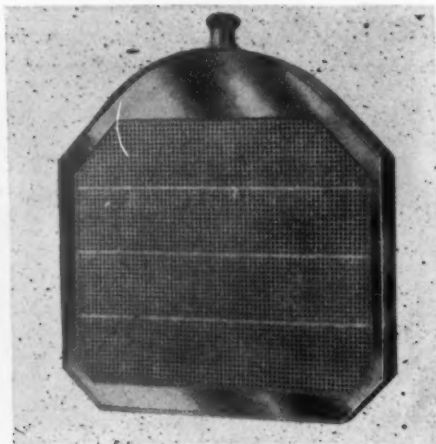
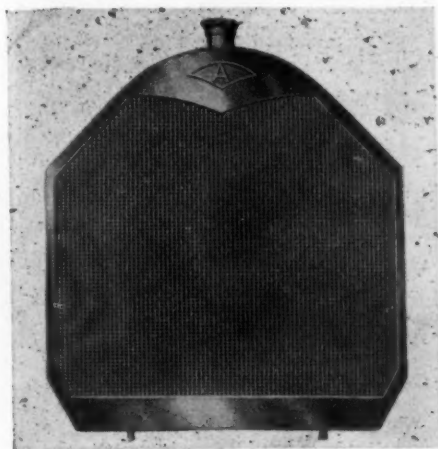


FIG. 4—BRISCOE AND McCORD FLAT RADIIATORS

In Fig. 3 is shown a special type of Long V-shaped radiator. It is claimed that its peculiar shape is accountable somewhat for its cooling as well as wind-resisting qualities.

English & Mersick—Another departure from the conventional flat type of radiator is the three-faced type, illustrated in Fig. 5, which is manufactured by the English & Mersick Co. The cooling surface of this cellular radiator is claimed to be greater than that of any other type holding an equal volume of water. A line of V-shaped coolers is made also by this concern.

Briscoe—A tubular radiator is one of the features of the Briscoe line. It is so constructed that the water in passing through the radiator flows almost entirely around the tubes. The simplicity and strength of this construction together with its manufacturing advantages and efficiency are its main features. The tubes are squared and held firmly by a strip of brass that forms the water space.

Fedders—Several different types of radiators are made by the Fedders Mfg. Works, but the feature of the line is a square tube radiator. This is made from a number of copper tubes so arranged that all four sides of the tubes come in direct contact with the water, or in other words, every tube or unit is entirely surrounded by water which is free to flow past any one of the four sides. Fedders square tube radiators are furnished with the tubes staggered, or with the tubes arranged one above the other in a straight line. The staggered construction, on account of lateral as well as vertical circulation is somewhat more efficient than the straight line design.

Kinwood—Kinwood radiators, which are made by the Kinzie Mfg. Co., are of the vertical flat tube type. The tubes are flat without crease or crimp and arranged in a vertical position. The radiator fins have a flat soldered contact with the tubes. The water space in all tubes is 3-32-inch

wide, extending from front to back, and it is claimed that the construction of the tubes and water boxes is such that the radiator can freeze without causing serious results.

Mayo—Mayo radiators are of the light vertical flat tube design, that is, the water circulating channels are comprised either of straight or zig-zag flat, vertical tubes. There are three types of the Mayo radiator. The standard type comprises zig-zag vertical tubes in which the air cells are almost entirely surrounded by water. In this construction the length of the vertical tube is greater than that of the other two styles or types, in which the tubes are straight from top to bottom; hence the efficiency of this type is greater than that of the other types, the wireless and honeycomb.

Livingston—The Livingston radiator is a zig-zag flat tube type in which the water flows from top to bottom, through zig-zag channels which are arranged to give the radiator a cellular appearance. The water flows throughout the length of the tube horizontally and vertically. In this design, no fins are required.

A-Z—Square-tube radiators are being marketed by the A-Z company. These

types consist of a number of square section vertical tubes. They are arranged so that water may pass on two sides, in straight lines downward. Thus, it is of the tubular type. The maker claims that the light weight of the radiator together with its large carrying capacity make it highly efficient. Repairing is facilitated by making the tubes easily removable. The A-Z radiator is made in but one size— $\frac{1}{4}$ -inch square tubes, but the tube lengths are made optional.

T-A-R—The feature of these radiators, manufactured by the Take Apart Radiator Co., is that they are made to be taken apart easily when repairs are necessary. Besides radiators for commercial cars, the Take Apart company is making tubular and cellular coolers for pleasure vehicles. In the tubular type copper fins are attached to flat vertical tubes. The fins make the product appear like a cellular radiator. Another noteworthy feature of T-A-R radiators is the ball-and-socket joint employed for attaching the cooler to the chassis.

Harrison—The Harrison Radiator Co. is marketing a line of tubular radiators whose vertical tubes are made of two corrugated strips. These strips are soldered together to form a series of vertical channels. Perforated copper fins are attached to the tubes in such a way as to give the radiator a cellular appearance. The hexagon cellular appearing radiator for commercial cars is a feature of the line.

Candler—Making its products light in weight has been the aim of the Candler Radiator Co. A line of tubular radiators is being offered, and it is claimed by the makers that the radiators will not become injured due to the water contents freezing. A cellular-appearing radiator has met this year with marked success.

Bush—Both tubular and cellular radiators are being marketed by the Bush Mfg. Co. The metal fins of one of the tubular types are so arranged as to make the product appear like a cellular. High efficiency as well as neat appearance is claimed for Bush radiators.

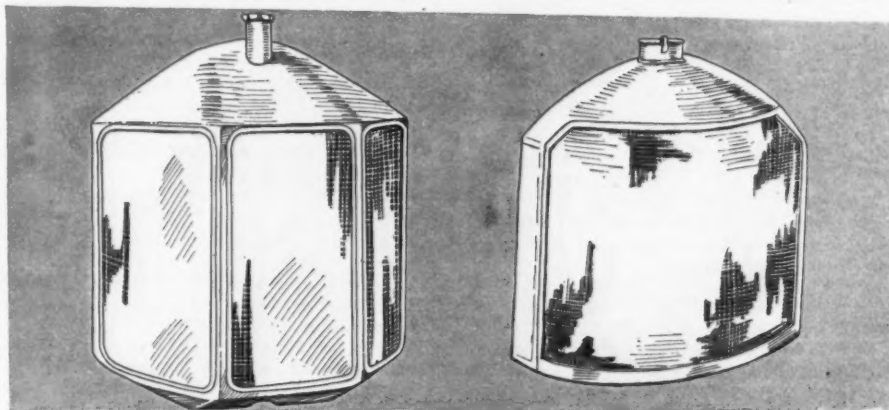


FIG. 5—ENGLISH & MERSICK CREATION AND JACKSON D-SHAPED



Brief Business Announcements



Agencies Appointed by Motor Car and Truck Manufacturers

PLEASURE CARS					
Town	Agent	Car	Town	Agent	Car
Baltimore, Md.	Gilbert H. Wehr	Cameron	Lancaster, Wis.	Horton Automobile Co.	Ford
Boston, Mass.	Harry A. Clapp	Palmer & Singer	Louisville, Ky.	W. P. Lothrop	Palmer & Singer
Buffalo, N. Y.	J. N. Blake & Son	Knox	New Albany, Ind.	E. T. Slider	Pullman
Cedar Rapids, Mich.	Marathon Sales Co.	Marathon	Northeast, Pa.	Ralph P. Wells	Pullman
Cincinnati, O.	Boye & Emmes Auto. Co.	Palmer & Singer	New Britain, Conn.	C. A. Dennison	Case
Columbus, O.	Emil Stutz	Stutz	Newburgh, N. Y.	Mason's Garage	Palmer & Singer
Chico, Cal.	Guynn & Guynn	Paige-Detroit	Olympia, Wash.	Blaine Esham	Reo
Danbury, Conn.	H. A. Hume	Case	Omaha, Neb.	Andrew Murphy & Son	Knox
Dover, N. H.	Pershaley & York	Pullman	Patch Grove, Wis.	Horton Automobile Co.	Ford
Dubuque, Ia.	O. S. Montz	Pullman	Paducah, Ky.	H. J. Livingston	Pullman
Des Moines, Ia.	Hawkeye Auto Co.	Apperson	Phoenix, Ariz.	Leon Jones	King
Des Moines, Ia.	Bernhard & Turner	Midland	Phoenix, Ariz.	M. P. Carrow	Glide
East Liverpool, O.	Tri-State Garage Co.	Buick	Phoenix, Ariz.	Tom Higley	Pratt
Elmira, N. Y.	Southern Tier Motor Co.	Palmer & Singer	Reno, Nev.	J. B. Wainwright & Son	Paige-Detroit
Findlay, O.	Lundy & Barton	Metz	Stamford, Conn.	Mechaley Auto Co.	Palmer & Singer
Findlay, O.	Lundy & Barton	Metz	Seattle, Wash.	N. J. Morehouse	Rambler
Fresno, Cal.	Roulland-Brown Automobile Co.	Paige-Detroit	San Jose, Cal.	Dixon & Evans	Paige-Detroit
Fennimore, Wis.	Horton Automobile Co.	Ford	St. Louis, Mo.	General Motor Car Co.	American
Findlay, O.	W. E. Van Emanhas	Buick	St. Louis, Mo.	General Motor Car Co.	Garford
Hartford, Conn.	Curtis & Prowe	Hupmobile	St. Louis, Mo.	Raymond Mancha	Century
Hartford, Conn.	Holdberg-Gastonguay Coal Co.	Velle	Thornville, O.	Rollo G. Swartz	Krit
Harrisburg, Pa.	Andrew Redmond	Overland	Utica, N. Y.	E. F. Benedict	Franklin
Harrisburg, Pa.	Ensminger Garage	Mitchell	Vancouver, B. C.	Maritime Motor Car Co.	Palmer & Singer
Harrisburg, Pa.	Ensminger Garage	Hupmobile	Volga, S. D.	J. C. Lee & Co.	Detroit
Kewaskum, Wis.	Nicholas Remmel	Studebaker	Wilmington, Del.	F. W. Ayers Garage Co.	Overland
Kalamazoo, Mich.	J. H. Duffany	Imperial	Wilmington, Del.	F. W. Ayers Garage Co.	American
Lancaster, Wis.	Horton Automobile Co.	Ford	York, Pa.	J. W. Richley Auto Co.	Mitchell

TRUCKS

Baltimore, Md.	Rittenhouse-Winterson Auto Co.	Service	Jacksonville, Fla.	Thomas-Williamson Co.	Gramm-Bernstein
Boston, Mass.	International Motor Co.	Mack	Lebanon, Pa.	George Krause Hardware Co.	Autocar
Boston, Mass.	International Motor Co.	Saurer	Muskegon, Mich.	Clark & Carter	Gramm-Bernstein
Boston, Mass.	Whitten-Gilmore Co.	Standard	Nagara Falls, N. Y.	Peter Lammerts	Gramm-Bernstein
Bridgeport, Conn.	J. L. Carpenter	Standard	Pawtucket, R. I.	J. O. Lindsley	Gramm-Bernstein
Bridgeport, Conn.	Harry B. Gates	Brown	Rochester, N. Y.	A. M. Zimbrich	Autocar
Canonsburg, Pa.	Auto Transfer Co.	Bessemer	Storm Lake, Ia.	Storm Lake Auto Co.	Modern
Denver, Colo.	Felkner Automobile Co.	Modern	Spring Valley, Ill.	Miller & Co.	Modern
El Paso, Ill.	El Paso Auto Co.	Modern	San Francisco, Cal.	H. O. Harrison Co.	Autocar
Elgin, Ill.	Elgin Motor Co.	Modern	St. Louis, Mo.	Muehling Motor Car Co.	Lauth-Juergens
Framingham, Mass.	C. B. Daniels	Autocar	St. Louis, Mo.	Brinkman Motor Car Co.	Lippard-Stewart
Gloversville, N. Y.	Gloversville Garage	Gramm-Bernstein	Tipton, Ia.	F. W. Gasterline	Modern
Hartford, Conn.	Goldberg-Gastonguay Coal Co.	Velle	York, Pa.	T. S. Pfeiffer Co.	Autocar

OMAHA, Neb.—Fred Johnson has been appointed manager of the Ford branch here.

Akron, O.—The Motor Starting Co. has filed papers increasing its authorized capital from \$25,000 to \$50,000.

Iola, Wis.—Swenson Bros. have purchased half interest in T. A. Austin's garage business. Case and Ford cars are handled by this company.

Chicago—W. B. Canis will shortly manage an Emil Grossman agency at 2637 Michigan avenue. E. G. bumpers will comprise the bulk of the stock.

Indianapolis, Ind.—The recently incorporated Capitol Body Co. has leased quarters at 326 West Court street. W. A. Lyons is head of the new company.

Flint, Mich.—C. O. Hetchler has been appointed trustee for the Cook Body Co., on Beach street. The company was operated by Robert H. Cook.

Boston, Mass.—A branch of the International Motors Co. has been opened, with Philip Ketchum at its head and Henry A. Bonelli on the floor.

Columbus, O.—The Independent Tire Co. with Frank Cain at its head, started business at 111 East Jay street. The company will handle seconds.

Hartford, Conn.—The Sigourney Electric Garage Co., with C. H. Brooks president and W. J. Gengras treasurer, will occupy a new building at 117 Sigourney street.

Grand Rapids, Mich.—J. N. Murray, as the head of the recently formed Furniture City Vulcanizing Co., has leased the second floor of the Rambler Auto Sales Co.'s building

at 327 Bond avenue. Mr. Murray is western Michigan manager for the Double Fabric Tire Co.

Hartford, Conn.—A supply store has been opened at 336 Ford street by the Universal Auto Co., heretofore in the repair business.

Portland, Ore.—W. C. Garbe has severed connections with the Studebaker company of Seattle to represent the Maxwell company here.

Detroit, Mich.—The Bob-Smith Co., of Chicago, has established general offices at 1101 Chamber of Commerce building, with E. W. Miller in charge.

Syracuse, N. Y.—Perl Davenport has purchased the garage and salesroom of the Warner company in Arsenal street and will establish his Ford agency there.

Hartford, Conn.—A. A. McLeod has opened the Aetna garage at 1227 Main street. Mr. McLeod, formerly with the Pope Mfg Co., has as associates A. C. Webster and G. C. Jensen.

Des Moines, Ia.—The newly formed De Sota Motor Co. has opened headquarters at 918 Walnut street. W. H. Van Sickle is the manager of the company, which will market De Sota cars.

Kewaskum, Wis.—A Studebaker agency has been taken over by Nicholas Remmel, head of the Remmel Machine and Foundry Co. A garage will be operated in connection with the agency.

Baltimore, Md.—The Cole Sales Co. has been organized, with A. Trust Poehlmann, president, and Lewis A. Woodland, sales manager. Cole and Stoddard-Dayton cars will be handled. The garage of the Stod-

dard-Dayton company at 1020 Morton street has been taken over.

Seattle, Wash.—The Michigan Auto and Buggy Co. has begun business at 1423 10th avenue, with John F. Campbell as manager.

Cleveland, O.—The Stevens-Duryea Co. has opened a factory branch at Euclid and Forty-sixth street, with C. B. Cook as manager.

Manitowoc, Wis.—Charles Brady has been appointed general manager of the Aluminum Castings Co.'s foundries in this city. His predecessor, Conrad Werra, has organized the Werra Aluminum Co., at Waukesha, Wis.

Montreal, Can.—The Weed Chain Tire Grip Co. will establish a Canadian branch here to be known as the Dominion Chain Co., Ltd. The main office will be at 4 Park avenue and in charge of W. P. Kearney. Walter B. Lashernthe will be president of the new company.

Winnipeg, Can.—Announcement is made by the Goodyear Tire and Rubber Co., at the Royal Alexandra, of the promotion of H. J. Hunter of the Winnipeg branch to the position of western sales manager. The western assignment covers Winnipeg and Victoria.

Indianapolis, Ind.—Additions to the Cole company's staff have been made recently. J. L. White, formerly purchasing agent of the Northway Motor and Mfg. Co., occupies the same position with the Hoosier concern. B. B. Holt has been appointed chief inspector at the Cole plant. A. C. Covert, formerly with the Packard company, and Louis Stratlow, formerly with Chalmers,

are two additions to the Cole cabinet. Mr. White's position formerly was occupied by E. E. Westman.

Boston, Mass.—H. W. Hall has been appointed manager of the Universal Motor Truck Co.

Lindsborg, Kan.—Charles Lander will succeed P. E. Zimmerman as manager of the Hagstrom Bros. Mfg. Co.

Buffalo, N. Y.—Hugh H. Goodhart has been advanced to advertising manager of the Lippard-Stewart Motor Car Co.

Saginaw, Mich.—Walter Leach and Harry Marianthal have purchased the repair business of Ranus & Taylor, on North Hamilton street.

Portland, Ore.—G. W. Nelson has formed the Rambler Auto Co., 342 Burnside street, and has taken A. G. Nelson and Alec Robb as assistants.

Moline, Ill.—Announcement is made of the appointment of Walter H. Wood as publicity manager of the Moline Automobile Co. Mr. Wood was previously on the advertising staff of the Chicago Examiner.

Los Angeles, Cal.—The Automobile Funding Co. of America, incorporated for the purpose of financing motor car dealers, has begun operations at 502 Los Angeles Investment building.

St. Louis, Mo.—The Kardell Motor Car Co. has taken over the business and stock of the local agent for Chase vehicles, the Chase Motor and Sales Co. C. A. Rohlfing, former manager of the Chase company, will manage the Kardell company.

Detroit, Mich.—Contracts for R. C. H. cars have been closed with H. O. Harrison, San Francisco, Cal., Harvey Haynes Co., Minneapolis, Minn., and J. Henry Schumacker, Philadelphia, Pa. The Harvey Haynes Co.

is made Minneapolis representative by the closing of the contract.

Lancaster, Wis.—Ford and Overland branch agencies have been established in Fennimore and Patch Grove, by the Horton Automobile Co., district agent. The repair shop and garage at Lancaster are now in charge of Parke Knapp.

Baltimore, Md.—Announcement is made that R. H. Croxton, head of the Detrolter-Baltimore Co., will change the name of that company to Motor Co., because the Reo is now being handled in connection with the Abbott-Detroit and Detrolter.

Milwaukee, Wis.—The Oakland-Wisconsin Motor Co. has been reorganized with a capital stock of \$50,000. The company handles Oakland, Empire and Detrolter cars. R. A. Creek is president and Allen H. Small treasurer and secretary.

Motor Matters Various Legislatures Are Discussing

HARRISBURG, Pa., Feb. 24—A number of bills were introduced in the Pennsylvania legislature last week, which are of great importance to motorists throughout the state. One bill was for the appropriating of \$3,000,000 for aid of township road building and maintenance for 2 years. The senate has finally passed the bill turning over to the state highway department the \$1,800,000 collected for motor car licenses for the past 2 years. The money was kept in a separate fund, but Auditor General Sisson declined to pay it over unless it was specifically appropriated.

Senator Beidleman introduced a bill designed to rid the state of toll bridges. It authorizes the state to purchase by regular condemnation proceedings bridges over 1,000 feet in length erected over streams by corporations organized under general or special laws for the use of which toll fees are charged.

Mr. Beidleman also will present another bill, authorizing the state highway department to erect wherever the need exists, free bridges in connection with the development of the state system of highways. In presenting his toll bridge bill Mr. Beidleman said the state, having abolished toll gates on all roads acquired by the highway department, it is inconsistent that toll bridges should stand between sections of free state road for the construction of which taxpayers have paid. The bridge bills are of state-wide importance and strong influence will be made to obtain the passage of these measures.

Ohio

Columbus, O., Feb. 24—The Ohio senate has passed three bills which were introduced and pushed by Senator Lloyd, of Franklin county, which affect the driving of automobiles. The object of the bills is to protect owners from joy riders. Penalties of from 30 days to 6 months' imprisonment and fines of \$200 to \$500 are provided for any person who refuses to render aid to any one after running them down with his motor car. A provision pro-

vides for the suspension of chauffeurs for drunkenness.

Workhouse sentences of 4 months and fines of from \$100 to \$500 are provided for any one convicted of taking a car without the consent of the owner. For removing any part of the necessary equipment of a car, sentences of from 3 to 6 months and heavy fine are provided. For mutilating

any part of a car heavy sentences and fines are provided.

A bill has been introduced in the Ohio general assembly by Representative Tetlow making it a misdemeanor for any one to blow a horn and ring a bell in a loud and unnecessary manner in the residence districts of the cities.

Representative Tetlow is also the author of another bill making it necessary to have every motor car equipped with a horn or bell with a sufficiently loud and distinctive noise to attract the attention of pedestrians and others who are in imminent danger of being run down.

A meeting of all the motoring organizations of Ohio was held at Columbus, February 19, for the purpose of taking part in pending legislation before the general assembly. The committee visited the governor who said he was for the bill now pending in the legislature basing the registration fees for cars on their horsepower. The governor said, however, he was in favor of leaving the matter to a referendum vote of the car owners of the state. It was urged that the payment of registration fees to \$30 or \$35 on a car was double taxation and opposed to the spirit of the constitution.

The committee represents both the Ohio Automobile Association and the Ohio Automobile Federation, the two rival organizations of the state. Both of the factions sat down to the luncheon and all differences were buried.

Missouri

St. Louis, Mo., Feb. 24—The St. Louis Automobile Manufacturers' and Dealers' Association, jointly with the dealers of Kansas City and St. Joseph, has introduced in the Missouri Legislature a bill to give a lien on motor cars for storage and repair charges. The lien is to be based on the written order of the owner to prevent the possible overcharging of unscrupulous repair men. This bill is pending in both the senate and the house.

A bill also was introduced that will do away with the practice of dealers lending duplicate license plates to purchasers.



SHOWS

February 20-March 1	.....	Toronto, Can.
February 22-March 1	.....	Brooklyn, N. Y.
February 24-March 8	.....	St. Louis, Mo.
February 24-March 1	.....	Memphis, Tenn.
February 24-March 1	.....	Cincinnati, Ohio
February 24-March 1	.....	Omaha, Neb.
February 24-March 1	.....	Paterson, N. J.
February 24-27	.....	Kansas City truck show
February 25-March 1	.....	Syracuse, N. Y.
February 26-March 1	.....	Fort Dodge, Ia.
February 26-March 1	.....	Glens Falls, N. Y.
February 27-28	.....	Lima, Ohio
March 3-8	.....	Sioux City, Ia.
March 3-5	.....	Cincinnati commercial show
March 1-10	.....	Deadwood, S. D.
March 3-8	.....	Sioux City, Ia.
March 3-8	.....	Bridgeport, Conn.
March 3-8	.....	Denver, Colo.
March 3-8	.....	Springfield, Mass.
March 3-9	.....	Des Moines, Ia.
March 5-8	.....	Columbus, Ohio
March 5-8	.....	Tiffin, Ohio
March 5-8	.....	Louisville, Ky.
March 5-8	.....	London, Ont.
March 8-15	.....	Boston, Mass.
March 10-15	.....	Cedar Rapids, Ia.
March 11-15	.....	Buffalo truck show
March 11-15	.....	Truck show, Des Moines, Ia.
March 12-15	.....	Peoria, Ill.
March 8-15	.....	Columbus, Ohio
March 17-22	.....	Wilkes-Barre, Pa.
March 19-25	.....	Boston, Mass.
March 20-24	.....	New Orleans, La.
March 24-29	.....	Indianapolis, Ind.
April 1-6	.....	San Francisco, Cal.
April 5-12	.....	Pittsburg, Pa.
April 13-19	.....	Pittsburg, Pa., commercial show

CONTESTS

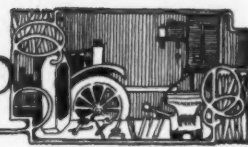
May 30	—Indianapolis speedway meet.
June 25-29	—Chicago Automobile Club reliability to Boston, Mass.
July 12	—French grand prix.
July 1	—Indianapolis to Pacific coast tour; promoted by Indiana Automobile Manufacturers' Association.
November 25	—Vanderbilt road race at Savannah, Ga.
November 27	—Savannah grand prix.

MEETINGS

March 6-7	—Second Federal Aid Good Roads Convention, Washington, D. C.
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The Motor Car Repair Shop



CARBON deposits itself often between the valve and valve seat. When such a condition exists, something has to be done to make the two parts fit perfectly. In Fig. 1 the valve is shown with carbon on the face and it will be noted that the valve does not seat properly. The result of improper seating is a gas leak, as shown by the dotted line. In other words, an improperly seating valve will cause a continual flow of gas to the cylinders, if the intake valve is leaky. Should the exhaust valve be carbonized, the compression escapes. Thus, in either event misfiring and loss of power will be noted.

In determining whether or not valves are not seating properly, turn the motor over slowly until resistance is felt. This should be done with each cylinder and should there be little resistance it is evident that there is a loss of compression. However, loss of compression may be due to a number of things other than carbon on the valve face. Insufficient clearance between the valve stem and push rod, will cause an improperly seating valve, and hence a loss of compression. Cylinder plug leaks will cause loss of compression. It remains to see that these things are in proper working order.

Improperly seating valves may be ground to fit perfectly. The first step in grinding valves is to get the materials necessary for the operation. The usual grinding compounds, are mixtures of emery dust and oil. Two grades of emery should be at hand—coarse and fine. Ground glass is considered by some to be better than fine emery. If no special valve-grinding tool is at hand, a screw driver or brace is suitable. Although not entirely necessary, a light spring, P, Fig. 2, about 2 inches long and 1 inch diameter is used to advantage. The only other requisites are some clean rags and clean gasoline.

Before the grinding operation is begun, the spring which supports the valve should be removed, together with the cylinder plug above the valve. The valve should be taken out and if any chalky deposit appears on the face, F, in Fig. 2, it should be scraped off with a knife. When doing this, care should be taken not to scratch the metal. The entrance to the cylinder proper should be plugged with some clean cloth, as shown at R in Fig. 2. This prevents any dirt from falling into the cylinders.

Cotton waste is recommended usually, but when this is used threads fall often into the cylinder. When these threads burn the greater part of the resulting mass is carbon. So, if cotton waste may cause a carbon deposit, why use waste? A little of the coarse emery is mixed with cylin-

Method of Valve-Grinding

der oil until it becomes a pasty mass. If bought at a supply store the emery is already mixed. This mixture is spread lightly over the face of the valve, with a saw blade or knife. The light spring mentioned before is then slipped over the valve stem. The valve is then put in its ordinary position in the motor.

Grinding is best accomplished by permitting the valve to turn but half way around. That is, in Fig. 2, a screwdriver, D, is placed in the slot at the top of the valve. The handle of the screwdriver is placed between the palms of the hands and the latter are rubbed back and forth. This does not permit the valve to make a complete circle. The valve should not be pressed hard against the seat, but only lightly. Just enough to bring the two parts in contact.

Every few turns pressure on the valve should be released and the spring allowed to raise the valve from the seat. After

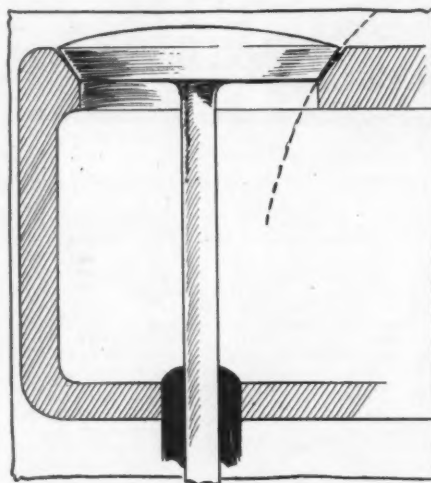


FIG. 1—HOW GAS LEAKS BY PITTED VALVE

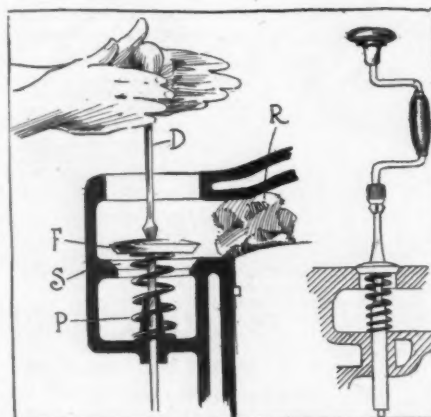


FIG. 2.—SCREWDRIVER USED FOR GRINDING VALVES. TO THE RIGHT ANOTHER METHOD USING BRACE

grinding with the coarse mixture for about 2 minutes the valve should be taken out and immersed in gasoline. The face, F, and seat, S, Fig. 2, of the valve should be wiped with a clean cloth. If the face and seat are shiny all around and have no little black spots on them, no further grinding is necessary.

But should there appear on the face or seat a number of blotches, the grinding should continue with the fine emery mixture. This operation should continue for 1 minute. It is good policy to grind the valve a little and then take it out and inspect the ground surfaces. As soon as the entire face and seat has a gray metallic luster, grinding need not be continued. After each valve has been ground, remove the cloth which plugged up the opening to the cylinder.

After all the valves have been ground a half-tumbler of gasoline should be poured into each valve chamber and compressed air applied. If no air is at hand a tire pump should be used to spray the gasoline. A clean cloth should be used to wipe the parts of the chamber. Before replacing the valves in their proper places every part should be clean.

Be Kind to Motor Cars

Man's food must be clean and wholesome, and so with the food of the cylinders. If oil is permitted to remain in the crankcase too long it loses its nourishing qualities just as food does if cooked and allowed to stand for a few days. It should be borne in mind that every part of the motor car has a certain work to perform and to do this work properly the part must be kept clean and, above all, properly fed.

Take for example the brakes of a motor car. Very few motorists ever dream of cleaning the brake bands, yet they wonder why the car does not respond to pedal pressure. A little kerosene on the brake bands will do wonders and if this is applied once every two weeks the brakes will require little mechanical attention.

Gearsets and transmissions are forgotten entirely by the average owner and driver. The thing is locked up in a case and does not cause any trouble. Then why monkey around? This rule does not hold good in this case. The oil in the gearset and transmission cases should be drained every few months, and the cases washed with kerosene. Often small pieces of metal get between the gears and remain there. These pieces come from the gears themselves. And when an out-of-round noise comes from the gearbox the owner wonders why the factory does not turn out better gears. It is not the fault of the gears as much as it is the little care given them after they have been put into the car.

WHY STROMBERG

Carburetors Are Highest in Price

But Worth It



- (1) A corner in the Assembly Department. None but skilled workmen employed.
- (2) Efficiency detectives. Inspectors at work.
- (3) Giving a STROMBERG the motor test.
- (4) Needle-valve getting micrometer test. The man who thinks in thousandths of an inch.



The STROMBERG is an ordinary carburetor with a college education.

Carefulness in its construction counts at the same time it costs.

Consider that it took 3 years' experimenting in STROM-

BERG laboratories simply to find a metal from which to manufacture STROMBERG needle-valves.

Consider that a corps of skilled workmen—efficiency detectives—shadow every part of every STROMBERG Carburetor from raw material to finished product. Consider that these inspectors regard every part defective till—on the scale-pan, under the microscope, in the micrometer, harnessed to a motor—it can prove itself to be otherwise.

Every STROMBERG float is weighed on jewelers' scales. A discrepancy of grains in weight condemns any float to the melting pot.

Every STROMBERG needle-valve passes through the hands of an expert who thinks in thousandths of an inch (see fig. 4 above). Every needle-valve has got to "measure up" under a jeweler's glass or be scrapped.

Every carburetor, when completed, undergoes inspection at the hands of skilled workmen, who know that to O. K. an imperfect STROMBERG is as much as their job is worth.

Every STROMBERG Carburetor before being "passed" for shipment must successfully operate a motor of the kind and size to which it is particularly adapted.

These are reasons why STROMBERG Carburetors cost more, but are worth it. Next week will appear "Why STROMBERG'S 1913 Guarantee reads, 'We Agree To Make Good.'" Your address on the back of a post-card will bring you all "Reason Why" Talks issued to date.

"Reason Why" Talk-10

Stromberg Motor Devices Co. 100 East 25th St., **Chicago, Ill.**

BRANCHES:

New York

Boston

Detroit

Indianapolis

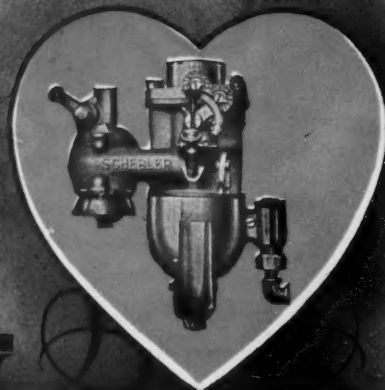
Minneapolis

San Francisco

Canadian Distributors: Russell Motor Car Company, Toronto.

SCHIEBLER

*The Aristocrat
of Carburetors*



"The Heart of the Automobile"

WHEELER & SCHIEBLER

"Pioneers in Perfection" of Carburetion

MANUFACTURERS
INDIANAPOLIS U.S.A.

THE SCHIEBLER IS THE ACKNOWLEDGED
STANDARD CARBURETOR OF THE WORLD

Branches

NEW YORK
BOSTON
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CHICAGO

DETROIT
DENVER
SAN FRANCISCO
LOS ANGELES
SEATTLE
MONTREAL CAN.
SIDNEY AUSTRALIA

Service Department

Distributors

Every city and town in
the United States and
Canada • Europe and
• Australia •

Why the Chicago Electric has been Klaxonized

"PRIOR to the use of your horns, we always equipped cars with bells. One of the difficulties in connection with using bells was the fact that they became inoperative in the winter time due to slush, mud, etc. To find out what your horn would do under such circumstances, we packed the horn from tip to the diaphragm full of snow and found that after one or two applications of the button the snow freed enough to give a very distinct signal and the muffling effect was practically negligible."

*— Excerpt from a letter by the
President of the Chicago Electric Motor
Car Co. to the Makers of the Klaxon.*

**And there are 5 other electrics—42
gasolene cars—regularly Klaxon-equipped**



KLAXONET

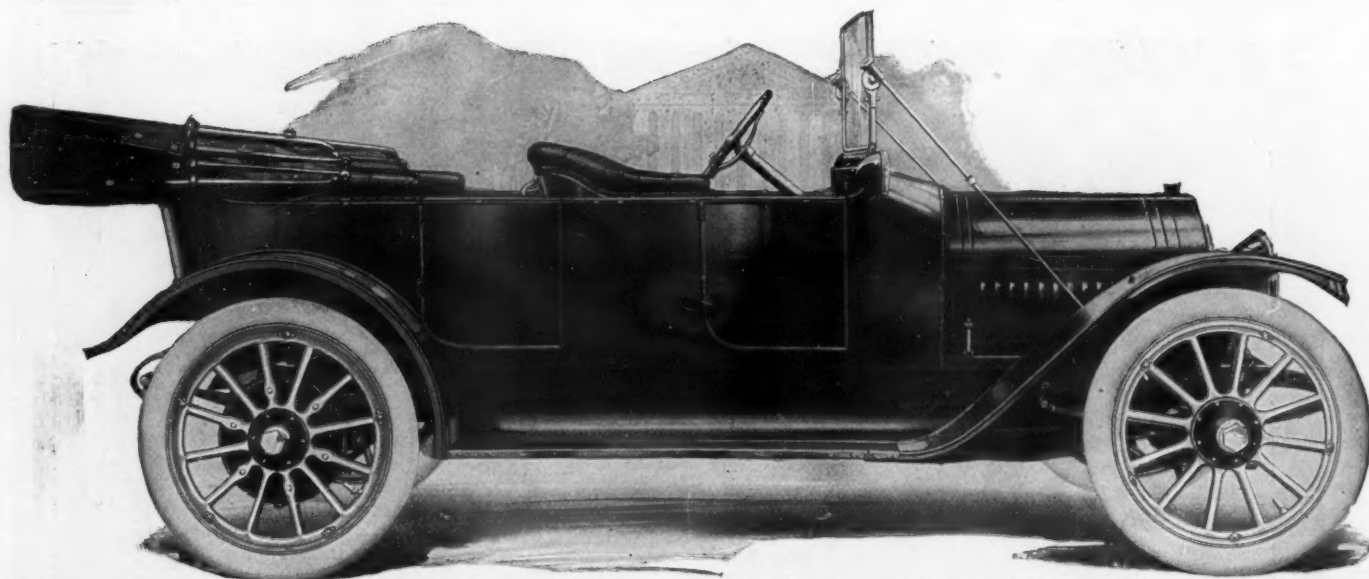
Lovell-McConnell Mfg Company Newark, N.J., U.S.A.

KLAXON

"The Public Safety Signal"



KLAXON



THE SUPERB 5-PASSENGER TOURING MODEL—DREADNOUGHT MOLINE M-40

Electric Self-Starter

In All the World No Car Like This

\$1950 The first Long Stroke Motor built in America increased to **\$1950**
Completely 40 H. P. Longer wheel base (124"), larger tires and brakes, **Completely**
Equipped demountable rims, electric lighting; 10" upholstery — more **Equipped**
 than 20 notable features. No other car can show such attention to details.

OUR FINE RECORD—Ten successful seasons have demonstrated the mechanical perfection of DREADNOUGHT MOLINE models.

Ten years of refinement and improvement have proven the merit of the fundamental idea in this wonderful car—that is attention to details. With its reliable mechanical features and the complete LUXURIOUS equipment, the DREADNOUGHT MOLINE is especially adopted for the USE of the WOMAN who enjoys driving her own motor car.

The notable features listed here you will find on but few cars selling at within \$500 of the price of the DREADNOUGHT MOLINE M-40 Five Passenger Touring model.

It is a STRIKING car in APPEARANCES, it cannot be excelled in COMFORT, LUXURY, and CONVE-

Added Features of the Dreadnought Moline M-40

10 in. added wheel-base (now 124 in.)
 Ward Leonard Electric Self-Starter and Electric Lighting System
 5 more horsepower
 Improved Steering Gear
 Gasoline tank under cowl — indicator and filler on dash
 Improved springs
 Inside control
 Ten-inch upholstery
 Turkish spring cushions
 Flush side bodies

Nickel trimmings
 Long stroke motor, 40 horsepower
 Enlarged brakes
 Large wheels and tires
 Exceptionally roomy body
 Demountable rims (set of five)
 Double independent ignition system
 Carburetor with dash air control
 Rain vision windshield
 Moline silk mohair top
 Speedometer

NIENCES. The reserve Power of its LONG STROKE MOTOR is an equal joy in crowded traffic, on hills and rough going, as well as on the boulevards.

MAIN GASOLINE TANK UNDER COWL makes perfect gravity feed on all grades and permits raising the carburetor and shortening the suction pipe six inches, thus avoiding recondensation in suction pipe and positively insuring the live snappy mixture which gives perfect carburetion, and the long stroke its greatest efficiency. Auxiliary tank is placed under seat — total capacity 20 gallons. Filler and indicator on dash. Every feature of this remarkable car is a distinct advance. Attention to detail is remarkable. Its mechanical perfections and luxurious appointments put it in a class by itself.

FOR EVERY DEALER'S SERIOUS CONSIDERATION—The DREADNOUGHT MOLINE M-40, an exceptional car backed by an exceptional Company, offers an exceptional proposition to dealers who appreciate the square deal, earnest co-operation and sales help, and who measure up to our standard. To such men we offer a contract that is fair and just; that corrects many trade abuses—that insures a living profit and many other advantages. Write us on your business stationery—tell us what you are doing and something of your local conditions (we are pretty well informed ourselves), then we can make you a live proposition.

IF YOU WANT TO BUY A CAR—WRITE TO-DAY FOR THE MOST READABLE AND INTERESTING AUTOMOBILE CATALOG EVER WRITTEN, YOU WILL BE GLAD TO GET IT.



MOLINE AUTOMOBILE CO.

40 Keokuk St.

East Moline, Ill.





Think Of Your Wife

When You Are Buying Your 1913 Car

Imagine her, if you can, on a crowded street, daintily dressed, grabbing a dirty, greasy crank handle and grinding away like a derrick hand.

NO WONDER LADIES LIKE ELECTRIC CARS

with their daintiness and convenience.

But your new car will be just as dainty, just as convenient for women's use, if you insist upon having it equipped with

ELECTRIC CRANKER AND ELECTRIC LIGHTS

However, their efficiency and sure, unfailing service depend upon the battery that operates them.

BE SURE YOURS IS AN



STORAGE BATTERY

Use Class A **GLBA** Battery with an Electric Lighting Generator

Use Class B **GLBA** Battery with an Electric Self-Starter

Write us for full information

Willard Storage Battery Co.

CLEVELAND, OHIO

New York Branch: 136 W. 52d St.
Detroit Branch: 1191 Woodward Ave.

Chicago Branch: 2241 Michigan Ave.
San Francisco Branch: 243 Monadnock Bldg.

Depots in all Principal Cities in the United States, Canada and Mexico

When Writing to Advertisers, Please Mention Motor Age.

Prest-O-Starter

Starts your engine (old or new) quickly and easily in coldest weather

For Four Cylinders \$20

For Six Cylinders \$25

\$1.50 extra for two-way valve necessary when the same Prest-O-Lite is used for both starting and lighting.

Here's a starter that adds practically no weight to your car, is perfectly simple and is as durable as the engine itself. Easily applied to any engine, old or new, very economical in the use of gas, and requires no expert repairing.

How Prest-O-Starter Works

The principle of starting a motor with Prest-O-Starter is the same as "starting on compression." A measure of acetylene, at low pressure, is pumped from your Prest-O-Lite into the cylinders.

Touch your spark—your engine starts.

Unlike "gasoline priming," it is not affected by heat or cold. It is certain.

In cool weather, by opening a valve on the dash, you can feed gas at low pressure into the intake manifold. This allows your engine to run on acetylene until it is warm enough to run on gasoline.

If the Prest-O-Starter did no more than prime your engine in this way during cold weather, this convenience would be well worth the price.

But Prest-O-Starter is more than a primer. When installed properly, it will start your engine, summer or winter, almost invariably without recourse to the crank.

Make Sure Your Starter Is Installed CORRECTLY—Look It Over!

The Prest-O-Starter is easy to install correctly. In fact, it's so very easy to install that some good fac-

tories and garages install it with utter carelessness, overlooking the one or two simple features vital to success in operation. Fortunately this is an easy matter for the car owner to correct, even if he isn't a mechanic.

Our literature tells you exactly how the Prest-O-Starter is installed, and how to adjust it. Anyone can give it the slight attention it may need or quickly tell a dealer where the trouble lies.

Every Prest-O-Starter is sold with the assurance of satisfactory service. The entire Prest-O-Lite Organization is back of every one. If you have any trouble, report it to us or to our nearest branch. We'll wipe it out quickly.

Insist Upon GETTING the Outfit COMPLETE

During warm weather the connection which feeds acetylene into the intake manifold is not needed. So some dealers are not installing it. But in cold weather this feature is vital. You're entitled to it. It's included in the price, so see that you get it.

Now—More Than Ever—You Need One

Your Prest-O-Starter, properly installed, will average better than 95 starts out of 100 attempts. The few failures are caused by your motor stopping on dead center, or cylinders filled with burnt gas. Both of these conditions can be easily avoided when stopping your motor. But should either or both happen, an eighth or a quarter turn of the crank, with the switch at neutral, will remedy the trouble at once, with all of the danger and labor of cranking eliminated.

Rest assured that no other starter can give you as high efficiency with as great economy, durability and freedom from mechanical trouble. The price is within easy reach.

Get in touch with any of our branches—or your dealer—or write us for descriptive literature.

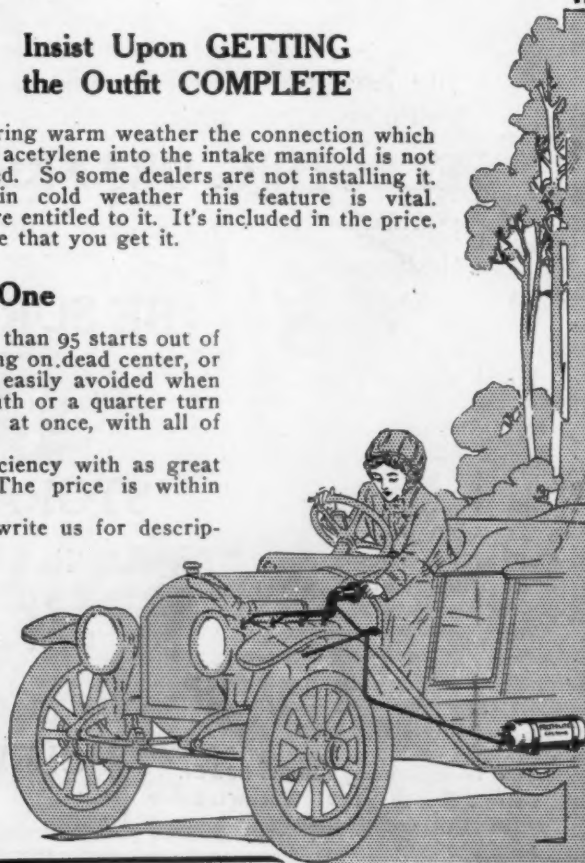
The Prest-O-Lite Co. 233 E. South St. Indianapolis, Ind.

CANADIAN GENERAL OFFICE AND FACTORY, MERRITTON, ONTARIO

BRANCH STORES AND SERVICE STATIONS:

Atlanta, Baltimore, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Dallas, Denver, Detroit, Indianapolis, Jacksonville, Kansas City, Los Angeles, Memphis, Tenn.; Milwaukee, Minneapolis, New Orleans, New York, Omaha, Philadelphia, Pittsburg, Portland, Ore.; Providence, St. Louis, St. Paul, Minn.; San Antonio, San Francisco, Seattle, Syracuse, Merritton, Ont.; Toronto, Ont.; Winnipeg, Manitoba.

Exchange Agencies Everywhere

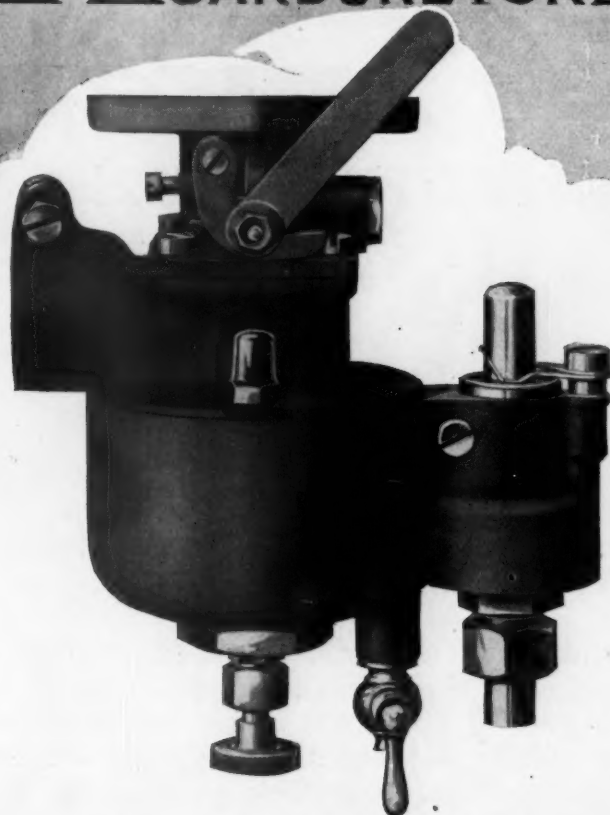


When Writing to Advertisers, Please Mention Motor Age.

HOLLEY

CARBURETOR

NO
MOVING
PARTS



This is the Automatic Carburetor that All the Engineers are Talking About

- ☐ It is revolutionary in its design that it has made all other carburetors old-fashioned, out of date.
- ☐ The new, self-adjusting Holley, with no moving parts.
- ☐ Better horse-power results and lower fuel consumption.
- ☐ 140,000 sold in sixteen months.
- ☐ Let us tell you more about it.

HOLLEY BROTHERS COMPANY
DETROIT MICHIGAN



When Writing to Advertisers, Please Mention Motor Age.

Warner

AUTO-METER

(MAGNETIC PRINCIPLE)

¶ We have more money invested in service stations alone than most speedometer manufacturers have in their factories.

¶ We have more people employed at our branches than most speedometer manufacturers have at their factory.

¶ Manufacturers, dealers and car owners alike know the value of such service.

¶ Warner Auto-Meters and Warner service are and always have been synonymous of permanency; they are the universally acknowledged standards in the accessory field.

Warner Service Stations are permanently maintained in all large cities

Warner Auto-Meter Factory, Beloit, Wisconsin



Model O-2
Price \$145

When Writing to Advertisers, Please Mention Motor Age.



ABSOLUTELY NEW.

**PRONOUNCED BY EXPERTS TO BE THE GREATEST
INNOVATION IN AUTOMOBILE TIRES OR TUBES
OF ANY OF THE INVENTIONS IN YEARS.**

It is built exactly as cut represents.

You will readily observe how such a tube will reduce the liability of puncture.

ELIMINATES PINCHING.

Lessens liability of blowouts; requires less air pressure—therefore, more life to casings, as well as easier riding.

Highest grade rubber.

Sixteen years' experience in its workmanship.

Moulded in the shape in which it is used.

No stretch in the tread.

Almost self-healing.

We have thoroughly tested it in every way and now are pleased to offer it to the public as being an article that will fill a long felt want.

We solicit your inquiries.

Manufactured Exclusively By

Kokomo Rubber Co. ^{Dept.} _D Kokomo, Ind., U. S. A.



Guaranteed against
Leaks
Short Circuits or
Break downs of
Any Character
For all Time

C.A. Mezger "SOOT PROOF" SPARK PLUGS

A big percentage of ignition troubles can be traced back to the spark plug and it is the petty, constant annoyance incident to disassembling and cleaning that takes away a good part of the pleasure in motoring.

All spark plugs are advertised as the best, but many of them do not live up to their advertised reputations. *The elements of correct design and cost of production are always responsible for the making of reliable plugs.*

Mezger Soot Proof Spark Plugs embody design that has successfully withstood eight years of the hardest kind of service. We began making these plugs *right* in the matter of design and, as a result, we guarantee perpetual freedom from ignition trouble in so far as the plug end of it is concerned.

Mezger's materials and methods of construction insure durability that will withstand all abuse, short of a physical assault upon the plug with a heavy instrument.

We give our guarantee to you that Mezger Soot Proof Spark Plugs cannot short circuit or develop weak ignition. Carbon deposits, responsible for these evils, are neutralized and made of no effect in the Mezger plug.

Mezger Soot Proof Spark Plugs cannot leak; they are gas tight from the time they are put in until the time they are taken out.

You can put these plugs in your engine and absolutely forget them. They will outwear any other plug on the market. They are self cleaning and, consequently, "troubleless."

Order a set from your dealer to-day, or, if you have *one* balky plug, substitute it with a Soot Proof Spark Plug and let our plug tell its own story in service.

If your dealer cannot, or will not, supply you—send direct.

C. A. MEZGER, Inc.
15 Canal Place NEW YORK

The Class Journal Company

THE
AUTOMOBILE
NEW YORK

PUBLISHERS
239 WEST 39TH STREET
New York

MOTOR AGE
CHICAGO

SUBJECT:
The U. P. C.

Mr. Car and Accessory Mfr.,
Alive Street,
Busytown,

When you consider the vital part the "trade" and "class" paper plays in all modern production and distribution;

when you consider the hundreds of thousands of dollars spent annually in those papers by each industry;

when you remember that you are contributing your share of the hundreds of thousands spent by the automobile industry;

-- is it any more than ordinary business caution for you to inquire into the character, the type of management, the business ideals of the men who are building your trade paper for you?

Are the group of men conducting The Automobile and Motor Age given to looking at things from a big, broad high-principled viewpoint? Are they men who make institutions of their publications? Are their publications of real service to the trade?

Between the class paper that is a leader and the paper that is merely a leech; the paper that feeds its advertisers, and the paper that feeds upon them, you men have your daily opportunity to choose:

You can put your patronage and your influence back of those men who are throwing together a few pages of indifferent reading matter as a bait for as many pages as possible of paid advertising matter. Or --

-- you can co-operate with those institutions, those men with the character, ability, courage and financial resources to serve you with trade organs of powerful efficiency.

Who and what are back of The Automobile and Motor Age?

Yours truly,

Condie West

*Read the letter addressed to you
on the preceding page*

The United Publishers Corporation

The group of publishers responsible for the Dry Goods Economist, The Iron Age, The Automobile and Motor Age, and the other publications listed below, publishers who have back of them a half century of experience, a record of an uninterrupted line of successes and all the resources and financial strength of a tremendous organization, invite the co-operation of those manufacturers who believe with them that a great industry deserves trade publications that are really great.

Dry Goods Economist	65 years old	<i>Founded 1847</i>
Dry Goods Reporter	41 years old	<i>Founded 1871</i>
Boot and Shoe Recorder	29 years old	<i>Founded 1883</i>
Commercial Bulletin	31 years old	<i>Founded 1881</i>
Drygoodsman	25 years old	<i>Founded 1887</i>
The Iron Age	55 years old	<i>Founded 1857</i>
Iron Age-Hardware	38 years old	<i>Founded 1876</i>
Metal Worker	36 years old	<i>Founded 1874</i>
Building Age	33 years old	<i>Founded 1879</i>
The Automobile	13 years old	<i>Founded 1899</i>
Motor Age	13 years old	<i>Founded 1899</i>
Automobile Trade Directory	12 years old	<i>Founded 1900</i>
The Blue Books	7 years old	<i>Founded 1905</i>
Commercial Vehicle	5 years old	<i>Founded 1907</i>

Half a Century of Service

Through half a century of service and the prestige that comes with real service, there has been gathered together and built up in the United Publishers Corporation an organization of men having not merely the publishing experience and publishing ability to plan publications along successful lines, but also the resources and financial strength to carry them through to success.

The ability of the organization needs no proof beyond the fact that in each of the three industries it serves—Dry Goods, Iron and Steel, Automobiles—its groups of publications have unquestioned leadership.

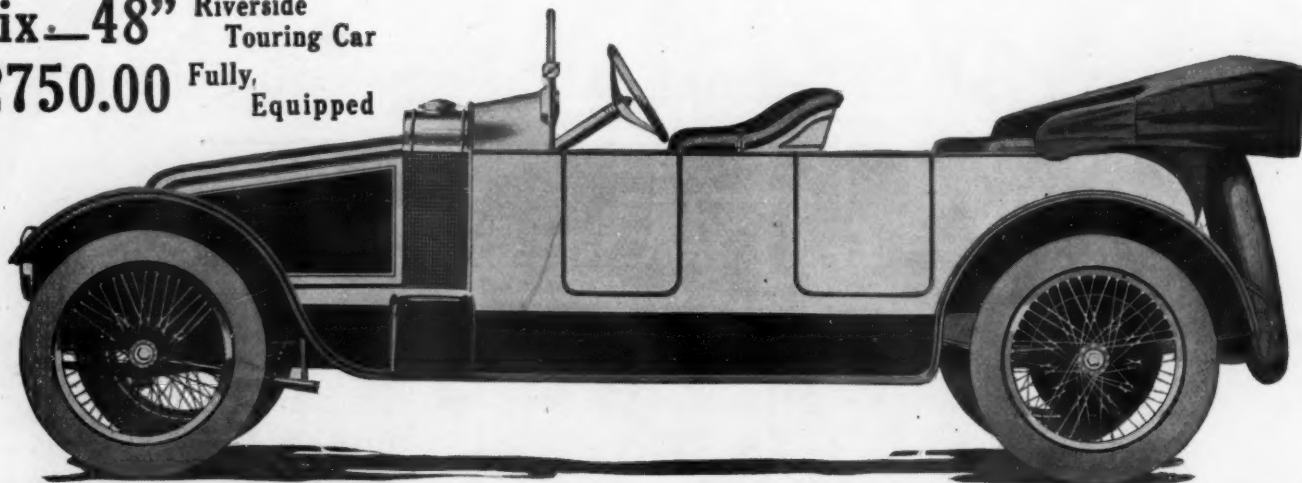
The stability of the organization is demonstrated when one recollects that two of the publications of the United Publishers Corporation—the Dry Goods Economist and The Iron Age—began long before the Civil War, and in their respective trades have long ago become not merely leading publications but recognized institutions.

The leaders of the third group—The Automobile and Motor Age—cannot boast the sixty-five years' service of the Dry Goods Economist, or the fifty-five years of The Iron Age. But compared with the age of the automobile trade itself, their age marks them not only as veterans but pioneers.

And the thirteenth year of their service finds them, by the combined verdict of the manufacturers of every section expressed in a ballot of paid advertising pages, the first and best of the publications serving the automobile industry, just as a similar ballot of paid advertising pages placed the Dry Goods Economist and The Iron Age first in their respective fields.

Keeton—"The Six" Demanded by Your Prospects

"Six-48" Riverside
Touring Car
\$2750.00 Fully,
Equipped



Are you selling a six cylinder car that combines all the advantages of the latest European and American practice in construction with a distinctive French type of design, at a very attractive price? Keeton is the car demanded by the public as the greatest value offered today, either at home or abroad. This "Six" is the most talked of car in this country. It was a leader from the day it was announced and stands out in a class by itself.

Buyers are enthusiastic over its remarkable qualities. Have you a car on your salesroom floor that can compare with it in construction and appearance? Go over it part by part. You will find only the very best of workmanship and materials.

The powerful small bore long stroke motor—dash-board radiating system, doing away with the troublesome water pump, fan and fan belt—electric starting and lighting system—left hand drive and right hand control—four speed transmission—imported annular bearings throughout—special alloy steels—long wheel base—wire wheels—large roomy body with luxurious upholstery—light weight and numerous other features all combine to make it a car that is a continual source of pride and satisfaction to the owner.

Aside from the utter simplicity of the mechanical features you have a French type of design that is only found on Foreign cars selling for three times the price of the Keeton.

The buying public has been quick to realize the extraordinary value offered in the "Six-48" Keeton, and we can put you in touch with dozens of purchasers right in your own territory who are anxious to see and buy this car.

Read the specifications of the "Six-48" Keeton. Compare it with any other cars irrespective of price and decide for yourself about its merits and selling possibilities.

We have a dealers' proposition that is very attractive and will make you money. You cannot afford to neglect this opportunity. Write or wire us at once.

KEETON MOTOR COMPANY

Phone Wal 1067

Lawton & M. C. R. P.

Detroit, U. S. A.

KEETON MOTORS, LTD.,—Brantford, Ont., Canada.

When Writing to Advertisers, Please Mention Motor Age.



Important Features Brief Specifications

Electric starting.
Full electric light equipment.
Small $3\frac{1}{4}$ -inch bore—long $5\frac{1}{2}$ -inch stroke.
Cylinders cast en bloc, large valves.
All moving parts completely enclosed.
Exceptionally powerful and flexible.
The most efficient cooling system in use today.
Radiator at rear of motor in proper and protected position.
Four speeds forward in transmission.
Direct on 3rd—geared up on 4th.
Left hand drive—right hand control.
Wire wheels—option of wooden wheels.
Extra detachable wire wheel or extra demountable rim.
Long 136-inch wheel base—long springs, special alloy spring steel, nearly flat under load.
Chrome Vanadium Gears and Shafts on imported annular bearings.
Pressure gasoline feeds.
Very roomy and comfortable bodies.
Best of foreign practice adapted to American road and touring conditions.

Complete Equipment

Electric starting and lighting system with $12\frac{1}{2}$ -inch headlights, dash lamps and tail lamp with license holder; 80-mile speedometer and eight-day clock combined with electric light; lamp for changing tires at night, with extension cord; dynamo electric horn; robe and foot rails; silk mohair top, with self-contained folding curtains and slip cover; double acting rain vision wind shield; option of wire wheels with extra detachable wire wheel or wood wheel with extra demountable rim; wheel or tire carrying irons; full set of tools; pump; jack and tire repair outfit; all touring bodies will take auxiliary seats.

Three Excellent Models

Prices F. O. B. Detroit

Riverside Touring Car, 5 passenger, completely equipped...\$2750

Two extra folding seats for above...\$25

Meadowbrook Roadster, completely equipped\$2750

Tuxedo Coupe, completely equipped\$3000

Chassis without tires or rear guards\$2250

Booklet on Request

The Atwater Kent Ignition System

TIME was when automobile engineers and the general motoring public thought they must equip their cars with a magneto. Today this idea is fast waning—in fact, it has been discarded by many of the foremost automobile engineers and discriminating motorists who are now demanding a more dependable source of current on their cars.

The Atwater Kent Ignition System more than held its own during the period of the magneto craze. We knew that the Atwater Kent Principle was fundamentally correct and that our system gave superior results to the magneto. This opinion was also shared by thousands of car owners who discarded the magnetos on their new cars and installed the Atwater Kent System.

The increasing use of electric lighting and starting equipment necessitates an ignition system better than the magneto—a system producing a uniformly hot spark at low speeds as well as high—a system giving a hot starting spark with the motor at a standstill—a system that is simple in principle and mechanism as well as in operation, and reasonable in initial and maintenance cost—in brief, a system of ignition that will measure up to the highest requirements of the most modern automobile practice.

Such is the Atwater Kent Ignition System—embodying the best features of both magneto and battery, without the weaknesses of either.

Remember, the Atwater Kent System can be easily and quickly installed on any standard make of motor, new or old, without the use of special tools or machine work, by anyone who knows how to time a motor, and sells for less than half the price of a magneto.

If you have an unsatisfactory magneto, or if your motor is not equipped with a half time shaft, you can use the Atwater Kent System by means of our magneto gear mounting, the cost of which is nominal.

In addition to our standard Type F System, we are marketing a new model—Silent Type K with automatic spark control and insulated primary circuit.

Whether you are interested in motor cars as manufacturer, dealer, owner, or prospective buyer, you should have a copy of our booklet "A". It covers the subject authoritatively and thoroughly and even the most experienced will find it interesting reading.

ATWATER KENT MFG. WORKS 4934 Stenton Avenue
Philadelphia, Pa.



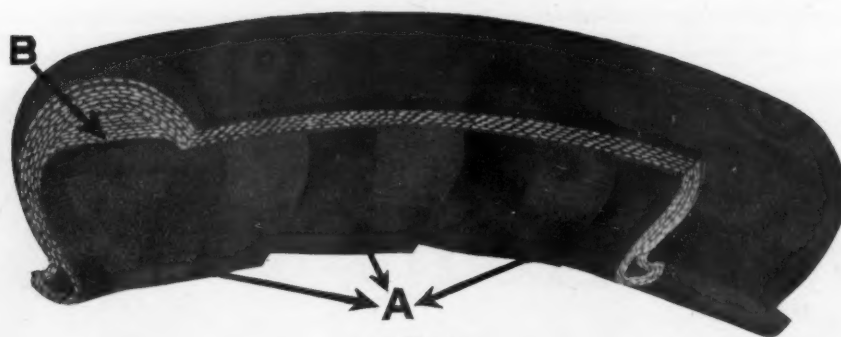
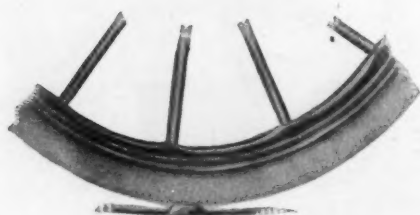


Fig. 1

WHAT KIND OF TIRES ARE YOU RIDING ON?

THIS KIND?



The above cut illustrates what happens when a solid tire meets with an obstruction. The tire has got to "ride over" the stone. Solid rubber has not enough "give" to absorb even the smallest inequalities in the road.

Every little hump in the surface of traction results in a racking shock or jar to the car's mechanism. This constant hammer, hammer, hammer puts a car on the short road to the scrap heap.

The discomfort passengers experience and the wear and tear on motor deliveries from "the solid tire jolt" have been instrumental in selling thousands of DAYTON Airless Tires—the tires with the "velvet" tread.

THIS KIND?



This cut illustrates what happens when a pneumatic tire strikes a stone. It doesn't "ride over" it as the solid tire does. It absorbs it partly. The tremendous air pressure, however, contained in the tire, works against complete absorption.

The result is that the pneumatic tire passes over the obstruction with a "jump" or "bounce." Were it not for this objectionable vibration, shock absorbers would be without a market.

Shock absorbers in themselves are an admission that pneumatic tires stop in the solution of the tire problem far this side of perfection.

THIS KIND?



The above cut illustrates what happens when a DAYTON Airless Tire strikes a stone. The stone sinks into the tire. Resilient rubber—not air under terrific pressure—is displaced, and piers or columns of high-grade elastic rubber squeeze down and bulge out into the open spaces which come between these piers. The tire passes over the stone with practically every vestige of vibration and bounce "strangled." Vibration has been designed out of DAYTON Airless Tires, making the car that carries them ride as easily as a cradle.

The DAYTON Airless Tire is constructed like a bridge, on piers of rubber (A, Fig. 1). (B, Fig. 1) is an annular rib of straight cut fabric and rubber corresponding to the beams of a bridge—a mechanically correct structure.

Dayton Airless Tires will not puncture or blow out—they are guaranteed for 5,000 to 8,000 miles—they do away with troublesome inner tubes—they do away with sweating over a hand pump—they are made of pure rubber not gelatinous tire filler—they are made in non-skid and smooth tread—they are as well adapted to heavy commercial vehicles as they are to light pleasure cars.

For Full Information Write for Our "Catechism"

DAYTON RUBBER MANUFACTURING CO.
600 Kiser Street, Dayton, Ohio

BRANCHES:

1878 Broadway, New York City; 585 Boylston Street, Boston; 2123 Michigan Avenue, Chicago; 31 Church Street, Buffalo; 332 N. Illinois Street, Indianapolis.

When Writing to Advertisers, Please Mention Motor Age.



Visible Gap Spark Plug Tells Its Own Story

Through the window in the porcelain of the plug—**outside** the motor—you can instantly tell if the plug is firing correctly. You can see the spark jump the gap in the central electrode at any time—the darkest night shows it up clearest.

It simplifies the trouble hunt by half.

If there is a spark in the window, but proper ignition fails, you know the points are fouled. In that case, just turn the knurled micrometer nut at the top of the plug with the fingers and separate the visible points still more. This increases the intensity of the spark, breaks down all oil or carbon deposits between the points and automatically cleans them in a jiffy.

And if there is no spark in the window, you know you must look to coil, batteries or magneto for your trouble.

You don't have to take the J. D. Plug out of the motor.

By this micrometer nut you can adjust each plug so as to give maximum sparking efficiency.

One glance through the window tells all.

You need a set of these plugs in your motor. Send for a set now, enclosing price and size wanted (or tell make of car), and we will forward them at once, prepaid. Our rigid guarantee of positive satisfaction or your money back goes with every plug.

You are the judge in this trial.

We make millions of spark plugs a year—that's our only business. We import our clays for our heat-defying porcelain, and use the best material on the market.

Yet the price of the J. D. Visible Gap Spark Plug is only \$1.00.

Perhaps you would like our free book on Ignition. It contains a mine of useful information. A card brings it.

JEFFERY-DEWITT COMPANY

551 BUTLER AVENUE

DETROIT, MICHIGAN

Largest Manufacturers of Spark Plugs in the World



Airease

Pneumatic Tires are the Most Obsolete Part of the Modern Automobile

WATCH THE
CHARACTERS
FROM
AIREASE
TOWN

There can be little doubt that the progress in tire manufacture has not kept pace with the progress displayed in the rest of the automobile industry. Everyone recognizes the fact that tires do not represent the same stage of development as the modern motor.

It is the tire problem that must be solved before automobiles can come into anything like universal use. It is AIREASE that has conquered this problem which has long been found too baffling for compressed air.

No product in the automobile industry affords the motorist such a combination of comfort, service and economy as AIREASE. It is the only tire filler that rides as easily as air, that retains its resiliency after thousands of miles of service, and positively cuts tire expense in two.

AIREASE is made from the formula of one of America's greatest chemists. It will not dry out or lose its life, and it has no material in it that can possibly weaken the rubber in your tires.



When Writing to Advertisers, Please Mention Motor Age.



Dealers! Here is Something to Think About

If AIREASE does not provide as easy riding as pneumatic tires, if it is not durable and free from rubber-damaging products, if, in a word, it is not successful commercially, why are the leading tire manufacturers afraid of it?

Why have the leading tire makers issued a statement declaring that they would not guarantee their tires if they were to be used with tire fillers? Because the merits of AIREASE are so obvious, its popularity with the motoring public so pronounced, that its use threatens to cut down tire manufacturers' profits, by cutting down motorists' tire expenses.

Dealers, the action of the tire makers indicates fear, fear of AIREASE. And this fear is based on the fact that they are secretly compelled to admire AIREASE, and they wish it could be driven from the market.

Here is a chance for live agents to sell a product that has jumped into

popularity from the very start, and caused pneumatic tire makers to worry. They will tell you that they won't guarantee any tires that are to be used with AIREASE, when they know that AIREASE is perfectly harmless to tires, and to prove this we still continue to offer motorists new inner tubes for nothing, if they are not satisfied with this wonderful tire filler.

We want more dealers who are progressive and American in spirit to oppose the tire trust, to support a marvellously good article, and make tremendous profits for themselves.

Write for our special agency proposition.

Refer all inquiries for Michigan to
HARLAN S. SMITH & COMPANY, PONTIAC, MICH.

For Florida to
THE FLORIDA AIREASE COMPANY, JACKSONVILLE, FLA.

AIREASE TIRE FILLER COMPANY

Corner 14th St. and Pennsylvania Ave., WASHINGTON, D. C.

NOW
THEY
STAND
IN LINE

MARK WITH X PROPOSITION YOU ARE INTERESTED IN
AIREASE TIRE FILLER COMPANY, WASHINGTON, D. C.
Gentlemen: I am interested in tire filling and desire to know the cost of filling my
tires. Front size, rear size,
☐ I am interested in Airease. Please furnish me cost of
filling plant for this territory.
Name
Street
City
2-27-13

39C

When Writing to Advertisers, Please Mention Motor Age.

Maintains the correct lubricating
body at any motor speed or heat

212°

Polarine

FRICION REDUCING MOTOR OIL

IT doesn't thin out on the hottest day—nor under the severest operating conditions. The water may boil but *Polarine lubricates* and avoids any friction damage.

It works as well in one car as another. The type or make doesn't matter at all. Polarine is the year-round, all-weather oil for any motor car or motor boat.

Produced by the World's lubrication specialists who have made a life study of friction problems.

Polarine keeps the surfaces unimpaired so cars can be re-sold without any replacements and thus bring an excellent re-sale price. It saves its cost many times over in eliminating repairs. Protects you from carbon and smoky plugs and makes motoring the pleasure it should be. Use it in your car, beginning today.

STANDARD OIL COMPANY

(AN INDIANA CORPORATION)

Makers of special lubricating oils for leading engineering
and industrial works of the world

ZERO

Flows Freely at Zero



New Departure Ball Bearings

American-made for American Trade

A review of the 1913 models of American built pleasure cars exhibited at New York and Chicago demonstrates a marked increase in the use of ball bearings in preference to those of other types.

If it is desirable to mount rotating parts upon a journal possessing less friction and requiring less work to drive than does the plain bearing, it is only reasonable to use that type of journal possessing the least friction, requiring the least power to drive, and, therefore, the most efficient.

The ball bearing is ten times as efficient as a roller bear-

ing under same load conditions, and thirty to fifty times as efficient as a plain bearing.

The American made New Departure is the quality bearing of the world. This bearing is to be found in 80 per cent of the cars manufactured for 1913 selling.

See the New Departure demonstrated at the Boston Show, Space Number 430, Balcony, March 8th to the 15th.

A pamphlet discussing the relative success of all types of bearings in eliminating friction is now on the press. Send for your copy today.

AMERICAN

GENIUS

ALWAYS

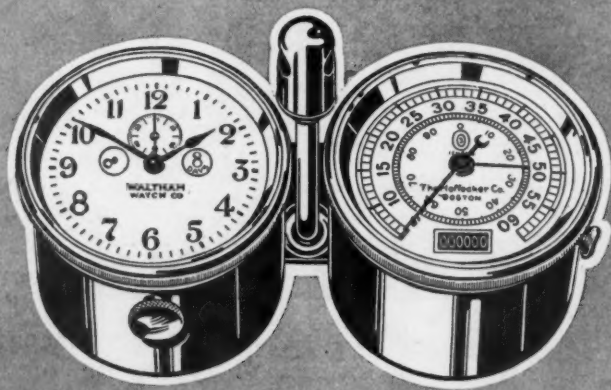
WINS

The New Departure Mfg. Co.
Bristol, Conn.

Western Branch: 1016-17 Ford Bldg., Detroit

"THE • STEADY • HAND"

HOFFECKER SPEEDOMETER



*"The
Steady
Hand"*

REGULAR
EQUIPMENT
ON
NATIONAL
AND
LENOX
CARS

What's in a name? Everything, if the name is HOFFECKER, and the article a speedometer. The name "HOFFECKER" stands for the best in speedometer construction, and HOFFECKER methods have combined with an infallible principle to keep the "Steady Hand" speedometer where it belongs—in front.

THE HOFFECKER COMPANY

Main Offices:
MOTOR MART, BOSTON, MASS.

1779 Broadway, New York; 1217 Huron Road, Cleveland;
Sheridan & Palma, Pittsburg, 1334-36 Race St., Philadelphia



"THE JEWELLED"

WALTHAM

❖ TIMEPIECE ❖



The Waltham eight-day time piece for automobiles is the only eight-day time piece manufactured with fifteen jewels and a temperature adjustment.

Every Waltham automobile time piece is constructed on the Waltham principle and conforms to Waltham Standards. This fact means unsurpassed quality and perfect reliability under any road conditions.

WALTHAM WATCH CO.

WALTHAM

MASS.

History of the Steering Ball

A



! It might seem at first thought that the little steering-ball of the Timken-Detroit Front Axle, like Topsy, 'just grewed,' or just happened.

! Well, it didn't. It was developed by years of study from a crude affair to a graceful, accurate thing, with a reason in every line and curve.

! Timken Experience was the teacher.

B



! In the early days, every axle maker merely bent up the end of his steering-arm and turned the tip into a ball, as shown in figure 'A.'

! It didn't take long to learn that this was too crude and inaccurate. The arm itself had to be elastic, the ball had to be very hard to resist wear. Different steels—different heat-treatments were required because the arm and the ball had very different duties to perform. So we came to a ball whose shank passed through the end of the drop-forged arm. It was a great improvement, though far from the present state of perfection.

! Then began the real evolution of the Steering-Ball of the

Timken-Detroit Front Axle

! First, the shank was straight and fitted snugly in its hole; rivetting the lower end pulled its collar firmly against the top of the arm, like figure 'B.'

! Whenever a break occurred it was always right at the bottom of the ball itself, so its neck was strengthened by a fillet and it looked like figure 'C.'

! After that there were fewer breaks, but these few came just above the collar, so the shank was enlarged at the collar and tapered toward the ball till it looked like figure 'D.' For added strength a castellated nut below replaced the rivetting.

! While this evolution was in progress, the axles were getting the severe jolts, jars and vibration of every-day service in thousands of cars, and sometimes, after long wear, the tightening of the nut underneath failed to hold the collar of the shank securely against the arm. That was easy to overcome by tapering the lower part of the shank so it would draw down to a tight fit, and could be drawn further down as vibration caused some looseness and wear. It looked like figure 'E.'

! It took a long time to bring out the fact that after thousands of miles of pound and vibration and taking up for wear, a time would come when the shoulder would meet the top of the arm and further take-up was impossible.

! So we increased the angle and left off the collar, as shown in figure 'F.' Now you get the tightest kind of a snug fit at the start, and keep it tight by turning up the nut as slight wear occurs. There is practically no limit to the amount of adjustment.

! In a previous advertisement we told how the ball itself is ground after hardening so it is a true sphere—and how a perfect sphere prevents pounding and the wear that would make it unsafe.

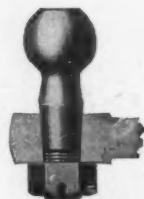
! The steering-ball with its shank is one of the smallest parts of a Timken-Detroit Front Axle—yet very important as are all the other parts, large and small.

! This history of the ball is just like the stories of development of every other part. The ingenuity and the study of able designers couldn't possibly foretell everything that experience was bound to show up.

! In addition broad experience covering hundreds of thousands of cars of every type—pleasure and commercial—working under every possible condition of service—has been a prime essential in the evolution of axle parts that will give the maximum of service to the user.

! From the dawn of the motor-car industry Timken-Detroit engineers have been getting just such experience.

F



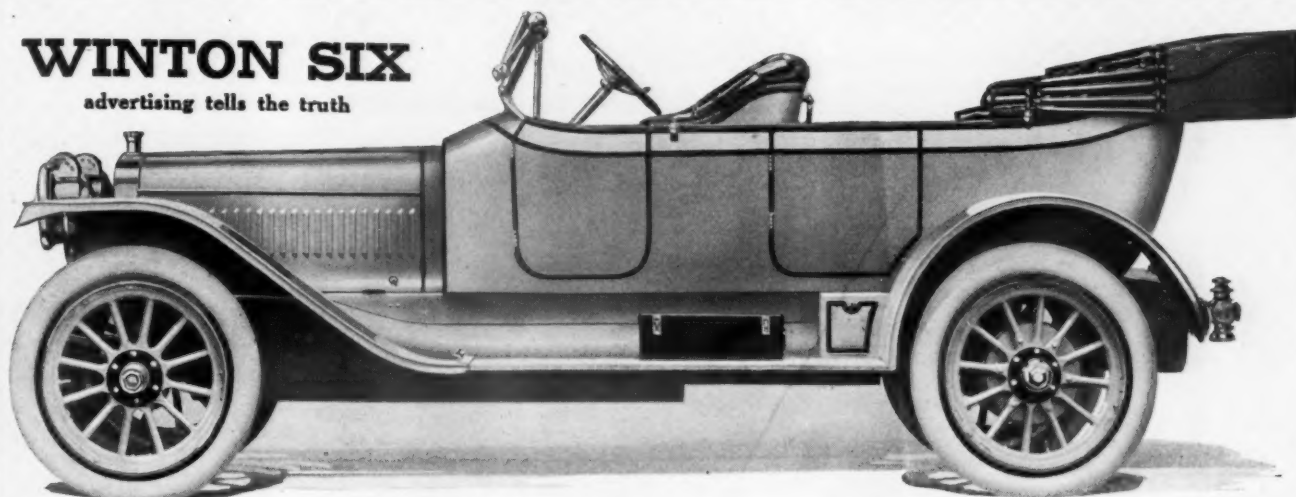
The Timken-Detroit Axle Company

D e t r o i t , M i c h i g a n , U . S . A .

The only axle manufacturer licensed to make axles equipped with Timken Tapered Roller Bearings

WINTON SIX

advertising tells the truth



Leading the Procession vs. Trying to Keep Up With It

Most makers produce new models every year—in an effort to keep up with the procession.

Not so with the Winton Company. The Winton Six was so far in the lead when it was first produced (June, 1907) that it is now in its sixth successful year without having required a single radical change.

And no wonder. For the Winton Six was the world's first self-cranking car. It was the first six in the world ever produced in a factory devoted **exclusively** to six-cylinder cars. And it is the only car in the world (of any type) whose repair expense cost is known. Sworn reports of individual owners, covering more than a million miles of travel, give the Winton Six a record of 29.2 cents repair expense per 1000 miles.

The Winton Six is a car you can safely trust. It has no experimental features. It is the best proved six in the world. And, because we have no watered stock and no outstanding bonds or mortgages, we can sell you this leader of sixes at a price that competition cannot touch—\$3000.

You will like the Winton Six at first sight, and the better you know it, the more you will recommend it.

Shall we send you our latest catalog and upkeep book? Write today.

The Winton Motor Car Company

(The World's First Maker of Sixes Exclusively)

424 Berea Road, CLEVELAND, OHIO

WINTON BRANCH HOUSES

NEW YORK.....Broadway at 70th St.	BALTIMORE.....Mt. Royal at North Ave.	MILWAUKEE.....82-86 Farwell Ave.
CHICAGO.....Michigan Ave. at 13th St.	PITTSBURG.....Baum at Beatty St.	MINNEAPOLIS.....16-22 Eighth St. N.
BOSTON.....674 Commonwealth Ave.	CLEVELAND.....1228 Huron Road	KANSAS CITY.....324-326 Main St.
PHILADELPHIA.....246-248 N. Broad St.	DETROIT.....995 Woodward Ave.	SAN FRANCISCO.....300 Van Ness Ave.
	SEATTLE.....1000-1008 Pike St.	

When Writing to Advertisers, Please Mention Motor Age.

\$985

F. O. B. Toledo

Completely Equipped

Self-Starter
30 Horsepower
5-Pass. Touring Car
110 inch Wheel Base
Timken Bearings
Center Control

Overland**\$985**

F. O. B. Toledo

Completely Equipped

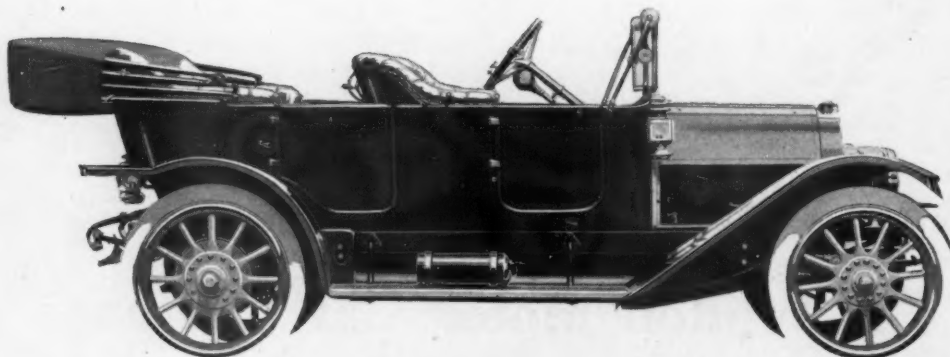
Remy Magneto
Warner Speedometer
Mohair Top and Boot
Clear Vision, Rain Vision
Wind Shield
Prest-O-Lite Tank

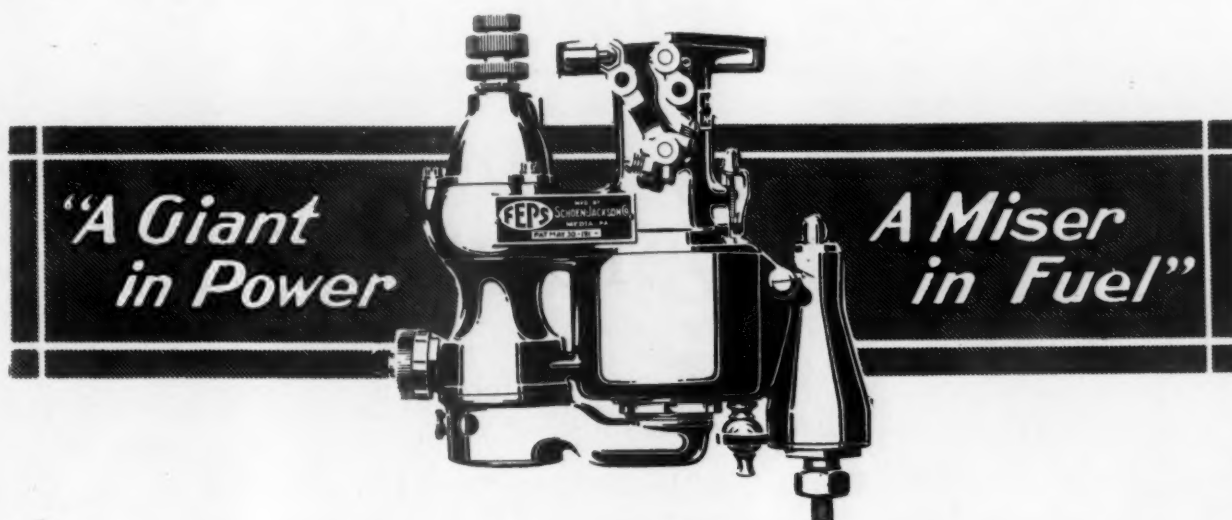
ONE Overland dealer alone will handle 4,000 cars during 1913. This is as many cars as 90 per cent of the American factories make in a year.

Whenever you find the greatest demand you can depend on getting the greatest value. Remember that our entire 1913 output of 40,000 cars has already been bought or contracted for.

Catalogue on request. Please address Dept. 46.

The Willys-Overland Co., Toledo, O.





*"A Giant
in Power"*

*"A Miser
in Fuel"*

The **FEPS CARBURETOR**

A car is only as efficient as its carburetor. This fact requires no qualifying. It has been brought forcibly, disagreeably to your attention many times in your motoring experience. The carburetor has been the one weak link in the chain of automobile efficiency. Now comes the Feps to complete and perfect that chain beyond even your cherished hopes.

The Feps will give you a perfect gas mixture at all speeds. It embodies an entirely new principle of auxiliary air and gasoline supply that produces marvelously increased flexibility, greatly argued power with an

increase of 25% to 50% in miles per gallon of fuel in any car.

It contains no springs, cams, balls or reeds. All adjustments once made are permanent. It uses with the utmost freedom, power and economy the lowest grade of gasoline on the market today, and is absolutely unaffected by any of the conditions regarded as detrimental to carburetor efficiency, such as high or low altitude or changes of temperature.

It embodies a new and never failing device for quick starting.

It can be tested in our every claim on your car at our risk.

See the Feps at the Boston Show, Mechanics Building, Space E-426

Write Dept "G" for Descriptive, Illustrated Booklet.

Schoen - Jackson Co. Media, Pa.

THE YEAR'S ADVERTISING OPPORTUNITY

Right now, Mr. Advertiser, we enter upon the thirteen harvest weeks of the motor-buying year.

More retail business will be done in these 13 big weeks of March, April and May, than in all the remaining weeks of the year.

And don't overlook this fact—

when the dealer is busiest is the time to advertise the most.

Once more—

that dealer is busiest whose manufacturer advertises most, in the busy season.

Right now, when interest is at buying heat, when the American motor-public is doing its 1913 buying, is the time to tell your story, the time to make sales.

Thirteen big advertisements in the next 13 issues of The Automobile and Motor Age will keep in the limelight your car, your spark-plug, your tire, your starter, your carburetor—or whatever your product may be—**at precisely the moment when you need all the publicity you can get.**

Don't you want to keep your dealers busy?

Start that copy on its way **now**—The Automobile to New York, Motor Age to Chicago.

THE CLASS JOURNAL COMPANY

THE AUTOMOBILE
239 W. 39th St., New York

MOTOR AGE
910 So. Michigan Ave., Chicago

\$2,000,000 Buried

By R. E. Olds, Designer

In Reo the Fifth, we bury at least \$2,000,000 a year where few men ever see it.

That's somewhere about \$200 per car.

It is not merely hidden. It is spent on extremes—on over-caution, some say.

And it may take months—even years, sometimes—to discover all that this buried money buys.

Not Charged to You

This hidden cost is not added to your bill. The price of this car will show that.

We save it all—and more besides—by unusual factory economies.

In one way alone—by building only one model—we save about 20 per cent.

By not changing models in any radical way we save a great deal more. That comes from right designing.

We build all our own parts.

And our factory efficiency is so well known that engineers from everywhere come here to inspect it. Magazine articles have been written about it.

That's the whole reason why a car like this can be sold for \$1,095.

You Get Twice What You See

In Reo the Fifth you see a beautiful car—roomy and rich and impressive.

The body is finished in 17 coats. The upholstering is luxurious. Every detail shows the final touch.

Flush electric dash lights instead of the side lamps. Nickel trimmings, even under the hood.

But don't judge a car by these showy externals. That's mere body-building—easy, usual and cheap.

What to Consider

The chief points in a car are endurance and safety. And those depend largely on steel.

So I have steel for each part made to my formulas, based on 26 years of experience. Then I analyze each part—analyze it twice—to prove its accord with those formulas.

Then I give each important part vast overcapacity. I employ the same tests as are generally used for a 45 h. p. engine.

Instead of steel castings, which cost half as much, I use in this car 190 drop forgings. Thus hidden flaws are avoided.

Roller Bearings

I might say Timken bearings and use only two. But I use them for endurance, not claims.

There are no ball bearings in Reo the Fifth, save in the clutch and fan. There are 15 roller bearings. The

usual ball bearings would cost one-fifth as much.

I use a \$75 magneto.

I use a centrifugal pump.

My carburetor is double heated—with hot air and hot water. That saves a world of trouble.

I use 14-inch brake drums. I use 2-inch, 7-leaf springs.

Tires 34 x 4

This car is vastly over-tired, and tires, as you know, are expensive.

I spend on tires about \$60 per car more than other experts think necessary. But nobody doubts that I save my users from three to five times as much.

Ideal Center Control

The leading cars, as you know, have come to left side drive. Also to center control.

But center control, in Reo the Fifth, doesn't mean the old side levers moved to the middle.

Our center control is a sort of cane handle. All the gear shifting is done by moving this handle only three inches in each of four directions. It's as easy and simple as moving the spark lever.

No reaching, no levers in the way. Both brakes are operated by foot pedals. Thus both front doors are clear.

The driver sits on the left hand side, close to the cars he passes. Yet his right hand controls the car.

Then my tests and inspections are immensely expensive. I test my gears in a crushing machine with 50 tons' capacity. I test my springs in another machine, for 100,000 vibrations.

Each engine is tested 20 hours on blocks, and 28 hours in the chassis. I use three 10-hour tests which are very unusual.

Each car in the making gets a thousand inspections.

Parts are ground over and over to get utter exactness. And our output is limited to 50 cars daily, so no man is ever rushed.

This exclusive feature costs nothing extra. But if it cost \$100 men would pay it, I believe.

My Idea of a Car

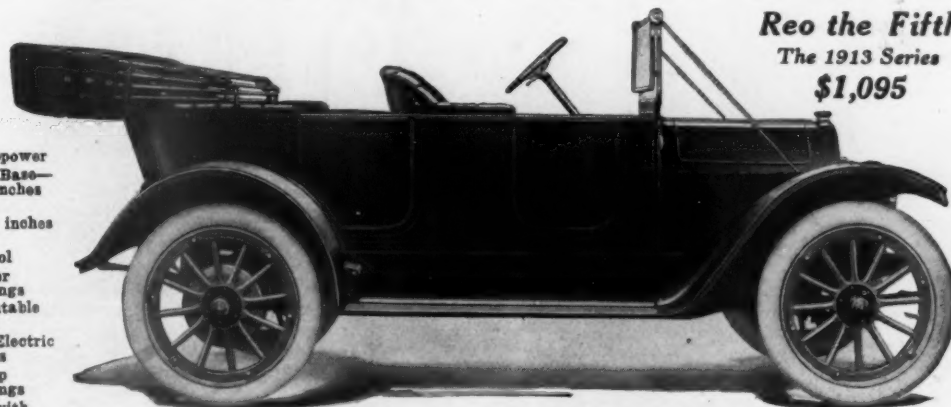
This is my idea of an honest car. It is the final result of 26 years spent in building cars.

I would not buy a car built otherwise myself. So I shall never build one.

My success is due to these extreme ideas. So are my legions of friends among motor car users. This year I am seeking for 10,000 more such friends.

A thousand dealers handle Reo the Fifth. Write for our 1913 catalog and we'll give you the address of the nearest.

30-35
Horsepower
Wheel Base—
112 inches
Tires—
34x4 inches
Center
Control
15 Roller
Bearings
Demountable
Rims
Three Electric
Lights
190 Drop
Forgings
Made with
8 and 2
Passenger
Bodies



Reo the Fifth
The 1913 Series
\$1,095

Top and windshield not included in price. We equip this car with mohair top, side curtains and slip cover, windshield, gas tank for headlights, speedometer, self-starter, extra rim and brackets—all for \$100 extra (list price \$170).

R. M. Owen & Co. General Sales Agents for **Reo Motor Car Co., Lansing, Mich.**
Canadian Factory, St. Catharines, Ont.

When Writing to Advertisers, Please Mention Motor Age.



Trucks equipped with the Sheldon Steel Wheels, Axles and Springs have the best commercial car equipment that the hand of man can make or devise.

Our famous steel wheel is positively unbreakable under any conditions of actual service. It weighs less than the artillery wheel and it is easier on tires than any wheel ever before used because of its light weight at the periphery.

The heat caused by hard service radiates rapidly from the metal of the Sheldon Steel Wheel - another reason why trucks equipped with this wheel are easier on tires.

The new Sheldon Axle for heavy service is another Sheldon triumph. It is made doubly strong wherever wear falls and friction is minimized by numerous and scientifically placed oil cups.

We offer these axles to the motor truck industry with the choice of the following bearing equipment:

Standard Taper Roller Bearings
Bower Straight Roller Bearings
New Departure, Rhineland, F & S, Hess-Bright, or
any standard Double Row Annular bearings
Single Row Annular Bearings can be applied by using
spacers.

This is a great innovation in axle manufacture. We have spared no effort or expense to make our axles perfectly "fit" and the manufacturer who offers a Sheldon equipped truck is giving his customers the most scientific axle equipment that can be made.

SHELDON AXLE CO.

WILKES-BARRE, PA.

CHICAGO BRANCH
68 East 12th Street

DETROIT BRANCH
1215 Woodward Avenue

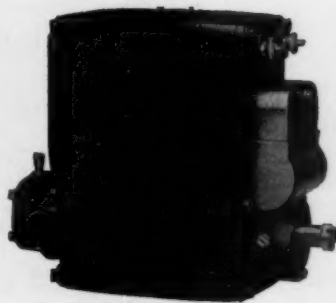
WESTINGHOUSE

ELECTRIC

IGNITION LIGHTING AND STARTING

These Systems Will Be
Found On Many of the Finest Cars

The Systems Using a Single Wire With a Ground Return



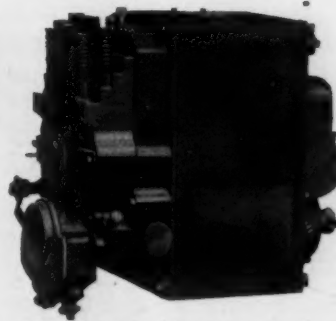
Lighting Generator



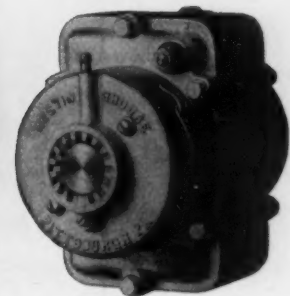
Ignition Coil and
Switch



Illuminated Dial
Voltmeter



Combined Ignition and Lighting
Generator



Starting Motor

Lighting—Westinghouse Lighting Generators automatically charge the battery without the use of any relays, or solenoid-operated regulators. There are no adjustments to be made. The battery is at no time charged at an excessive rate. The generator is slow speed, eliminating noise and wear.

Ignition—A high power, single-unit coil, acting in conjunction with timing and distributing parts on the generator, furnishes high voltage for the spark. The battery operating alone, or with the generator, supplies continuous power. The interrupter gives automatic spark advance. The spark is uniform, regardless of speed.

Starting—Minimum weight of motor, and minimum discharge of the battery are features of the Westinghouse Starting Motors, permitting the use of a smaller battery and smaller charging generator.

Illuminated Dial Meters—Three inches in diameter, with black dials and white lettering to avoid glare. The lamp throws light on the dial only, no direct rays being visible. Ammeters or voltmeters supplied, but voltmeters used for standard equipments.

The Westinghouse Company has adopted the grounded system of car wiring, using a single wire with a ground return. The wiring is simplified; one-half the usual amount of wire is required; better insulation is secured; proper current carrying area is possible; installation cost is lowered; and troubles are reduced to a minimum. Complete parts are supplied for this grounded wiring, including lamp connectors and incandescent lamps with the Center Contact.



Electrical equipment that is the product of the Westinghouse Company, and backed by its long established reputation, warrants the consideration of every motor car manufacturer.

Westinghouse Systems are proving the strongest talking points on high-grade 1913 cars.



Westinghouse Electric & Manufacturing Co.
East Pittsburgh, Pa.

Another Feature that Contributes to the *Absolute* Accuracy of the

ORBIN-BROWN SPEEDOMETER

It is an unquestioned fact that the construction of the flexible shafting is responsible for much of the inaccuracy and unreliability of speedometers in general.

There is too much friction in the casing—or friction is minimized at the cost of durability.

The Corbin-Brown flexible shafting overcomes these faults. It consists of a succession of eye-links and solid links as shown in illustration.

The solid link gives a smooth bearing, thus minimizing friction and insuring smooth running.



The strength of these links makes breaking almost impossible. However, if perchance, one should break, the relacing with a new link is so simple a matter that anyone can do it.



Write for Catalogue

Corbin Screw Division

(The American Hardware Corporation)

209 High Street

New Britain, Connecticut

Distributors: New York Philadelphia Chicago

TRANSMISSIONS

CLUTCHES

STEERING GEARS

"The Value of Our Product Is Not in Its Price—But in the Service Rendered"

"OF QUALITY"

WARNER GEAR CO., Muncie, Ind.

DETROIT OFFICE—628 FORD BLDG.

DIFFERENTIALS

CONTROL LEVERS

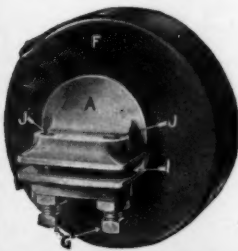
When Writing to Advertisers, Please Mention Motor Age.

LOOK TO THE RIGHT

And you will see an illustration of the one shock preventing device that really makes the car ride easy on rough roads without making it ride rigid and hard on smooth roads.

Gabriel Rebound Snubbers

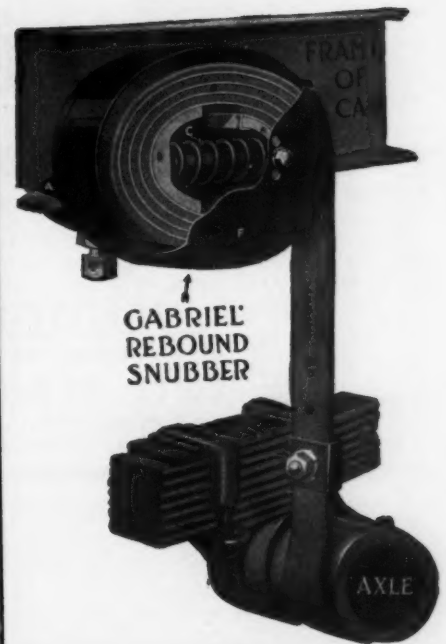
Control the spring action without spoiling the resiliency. They keep the occupants of car on the seat instead of allowing them to be bounced and thrown up in the air.



SNUBBERS are easily attached, do not rattle and require no adjustment. Leading cars use them as standard equipment. It will be to your advantage to investigate this device.

Send for Descriptive Price List and Ask Regarding Agency

GABRIEL HORN MFG. CO., 1415 E. 40th Street, CLEVELAND, OHIO



THE Dependable
F & S
Ball Bearings
BRETZ
COMPANY
250 West Fifty-Fourth, New York.

SOLE IMPORTERS

When Writing to Advertisers, Please Mention Motor Age.

ATTERBURY TRUCKS

Deliver the Goods

THE merchant who is competing most successfully with his business rivals is the merchant who delivers the best goods in the shortest space of time. Modern business demands quick and efficient delivery service. Both these qualities are embodied in the ATTERBURY TRUCK, the standard of commercial car perfection. Our famous one, two and three ton trucks are the marvels of the age.

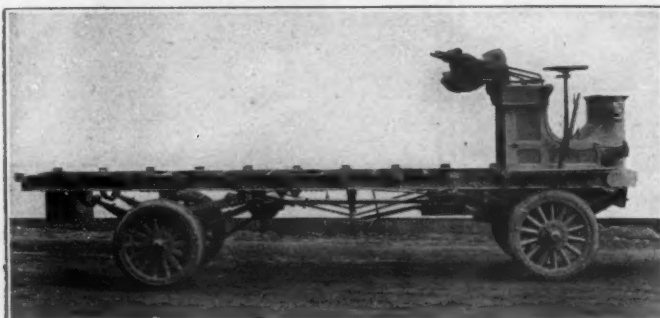
Send for our booklet on
"How to Deliver the Goods"

Atterbury Motor Car Co., 781 Hertel Ave., Buffalo, N. Y.

GASOLINE AND ELECTRIC CARS, MOTOR
TRUCKS, HOTEL OMNIBUSES, ETC.



Atterbury Model "B"
1-Ton



Johnson Trucks

1-Ton
2-Ton — Chasses
4-Ton

Write for Specifications

JOHNSON SERVICE CO., Milwaukee

SIMPLE

EFFICIENT



COMPACT

Indestructible

THE "INTENSIFIRE"

Is just what the name implies.
Makes your Magneto Spark Hotter.
Gives Increased Power and Speed.
Makes Cranking Easier.
Minimizes Gear Changing.

And at the same time

Decreases the heat at Point of Contact.
Doubles the Life of Platinum Points.
Cannot possibly injure any ignition system.
Can be used with Any Magneto.

Price \$5.00

AND YOU CAN ATTACH IT YOURSELF

MANUFACTURED BY

Electrical Specialties Manufacturing Co., Omaha, Nebraska

FOR SALE BY

THE OVERLAND SALES CO.

1140 Michigan Avenue, Chicago



Trade Mark Registered

WEIGHS 6 POUNDS PULLS 7000 POUNDS

"BASLINE AUTOWLINE" is a wonderful little steel rope with an approximate strength of 7000 lbs. It coils up flat under a cushion. You don't know it's there till you need it. Then "Basline Autowline" delivers the goods, every time. It will tow you home when your engine "goes dead," pull you out of the ditch or start your car out of a hole on its own power. Autowline stood every test on the last Glidden tour.

Sold by all good supply dealers. Only \$3.75.

BRODERICK & BASCOM ROPE CO., ST. LOUIS, MO.

The Little Steel Rope with the Big Pull

FREE Get the fully illustrated circular that tells all about "Basline Autowline."

JONES NEW DUAL WHEEL

One Wheel with the
Strength of Two



Jones Dual Wheel with Single Wheel
Under Each Tire



Jones Dual Wheel in its Component Parts

WHEELS

FOR PLEASURE CARS AND TRUCKS

Repairing and truing old wheels a specialty. Experimental wheels a specialty. We furnish and apply the Standard Universal Quick Detachable and Quick Detachable Demountable Rims.

Phineas Jones & Company

ESTABLISHED 1855

Main Works: 301-313 Market Street,
NEWARK, N. J.

Branch Factory: 12th Avenue and 55th St.,
NEW YORK CITY

STUTZ

The Stutz Is Quality Built

Every STUTZ car is built with as much care and pains as the costliest watch. Every ounce of material—every detail of workmanship that goes into the STUTZ is absolutely the best.

There are so many satisfied STUTZ owners throughout the country that we are not spending a nickel for national magazine advertising—we have demands for more cars than we can produce under our careful, painstaking system without it. We are putting that cost into STUTZ QUALITY.

We are building less than 1,000 cars—we have demands for three times that many.

If we built more cars we could not give the attention to the many details—such as are easily slighted in a great organization burdened with quantity production.

We could not build in quantities without sacrificing the QUALITY—and we would not sacrifice the QUALITY of one STUTZ car for the greatest quantity production in the industry. We would far rather be known as QUALITY producers.

There is no watered stock—no costly branches to maintain in the STUTZ organization.

Every nickel of STUTZ purchase price is given back to the user in STUTZ QUALITY.

These are the reasons for the superior quality of STUTZ cars—the reasons why the STUTZ gives genuine service—the reasons why every STUTZ owner is proud of his car, no matter in what company he associates.

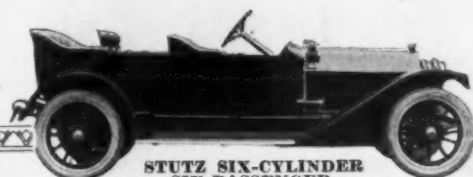
Stutz Models

STUTZ cars are made in five models

Six-cylinder, six-passenger touring car.....	\$2300
Six-cylinder Roadster.....	\$2250
Four-cylinder, six-passenger touring car....	\$2050
Four-cylinder, four-passenger touring car...	\$2000
Four-cylinder roadster	\$2000

Write today for advance Booklet A-2,
Sturdy STUTZ Announcement, Series B

THE IDEAL MOTOR CAR CO.
Manufacturers of Stutz Cars
Indianapolis Indiana



STUTZ SIX-CYLINDER
SIX-PASSENGER
TOURING CAR, \$2300

"PIONEERS"

THE HESS-BRIGHT MANUFACTURING
COMPANY

*Pioneers in the introduction of
Annular Ball Bearings*

Most extensive Resources and Plants
in existence exclusively for Ball Bearing
manufacture.

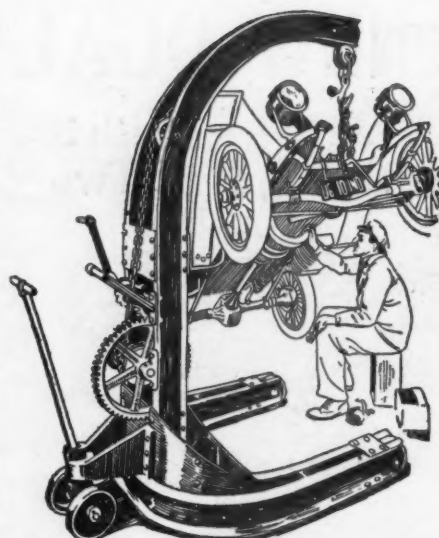
Enlarging and improving facilities—
product and capacity for distribution.

Main Offices and Plant No. 2:

On Line of Pennsylvania R. R. to New York

Front St. and Erie Ave.

Philadelphia, Penna.



DISCHARGE HALF YOUR HELP

Halve the expense
of your repair shop
and double its
profits. Stop tak-
ing 3 men and 4
hours to do a piece
of work that 1
man can do in 1
hour with a time,
temper, money-
saving

Portable Steel Garage Crane

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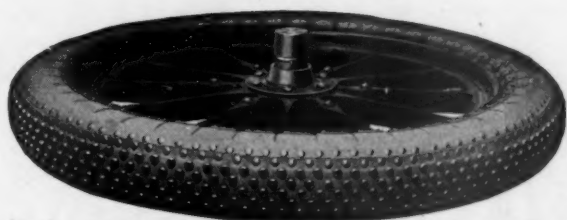
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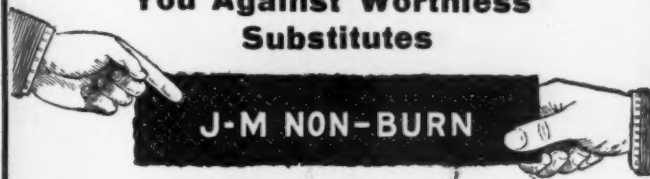
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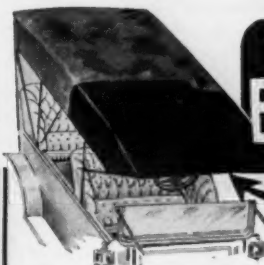
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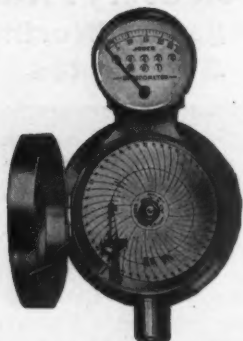
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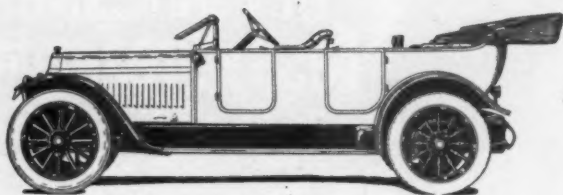
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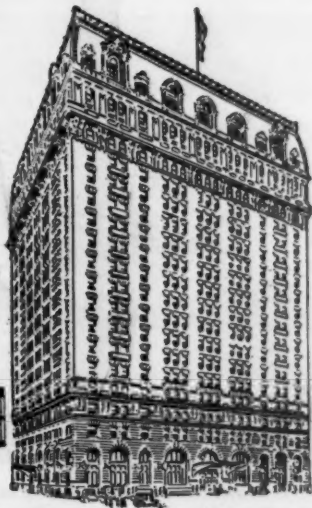
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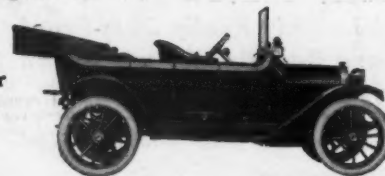
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CONTENTS

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| I.—Fifty-Watt Dynamo. | VIII.—Connection Board. |
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| III.—Field Punchings. | X.—Armature. |
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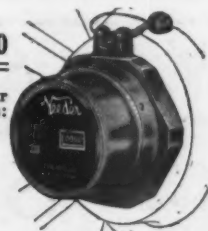
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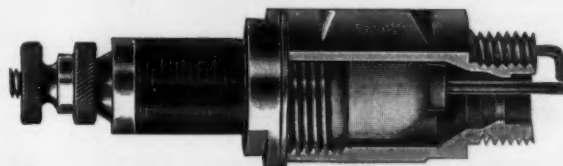
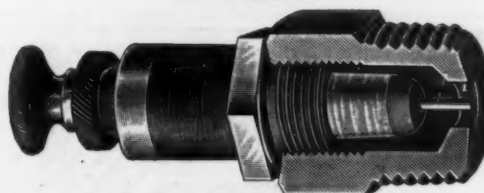
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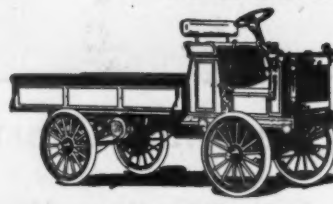
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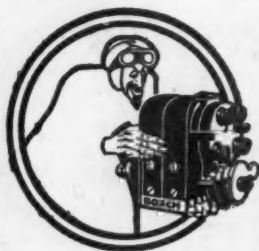
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The kind that never fail to work whether car is going backward or forward.



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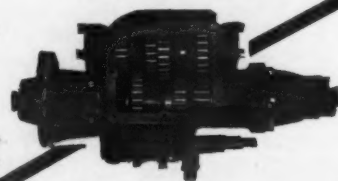
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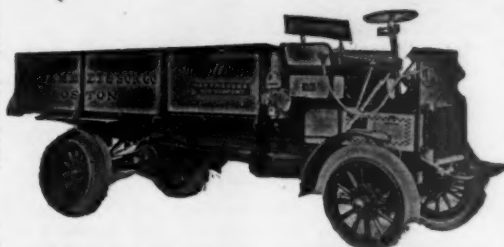
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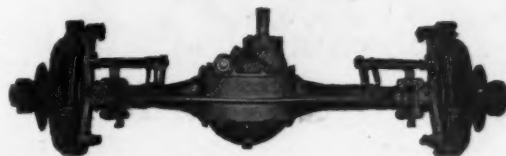
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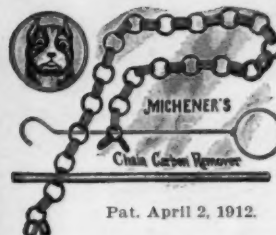


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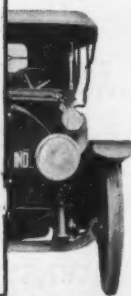
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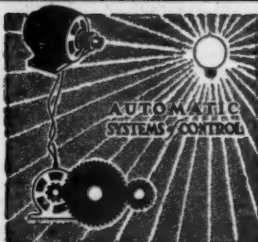


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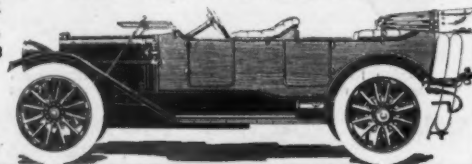
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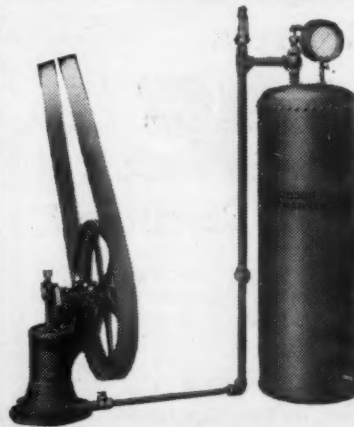
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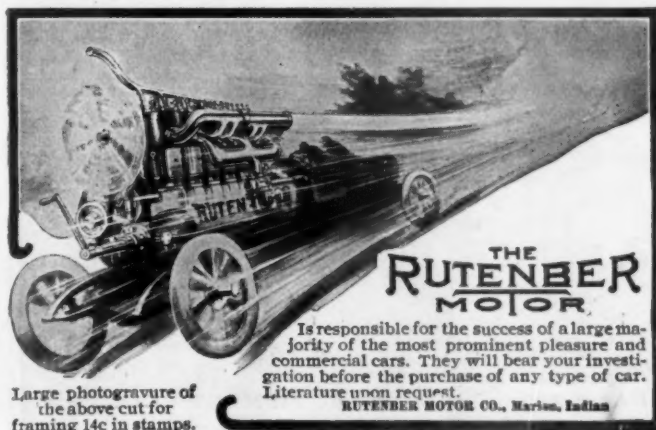
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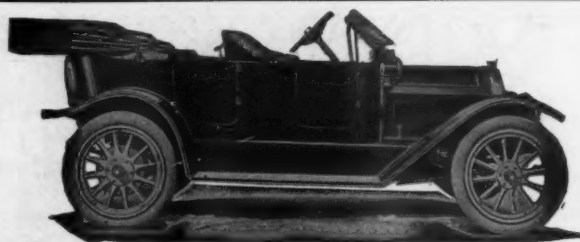
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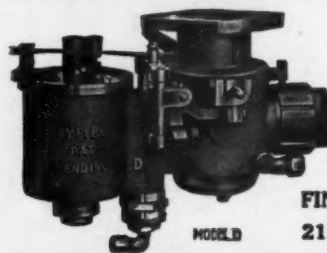
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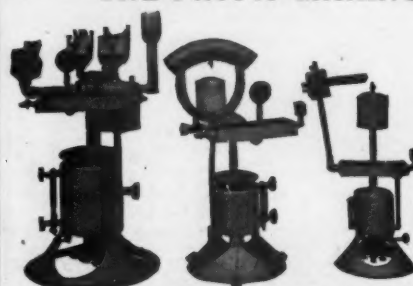
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1913

1913

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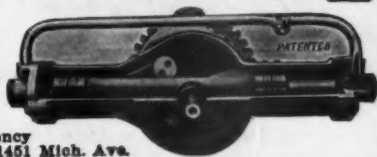
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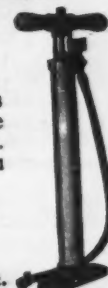
With gauge

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Make for greater resiliency, smoother riding. Save tires. Are quickly and easily removed. Practically indestructible. Absolutely rust-proof. Now being manufactured in America by the Standard Roller Bearing Company, of Philadelphia.

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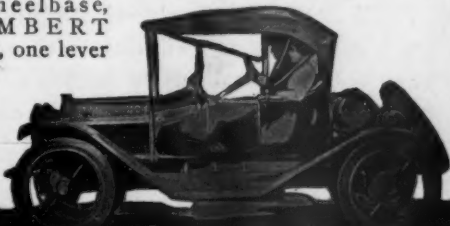
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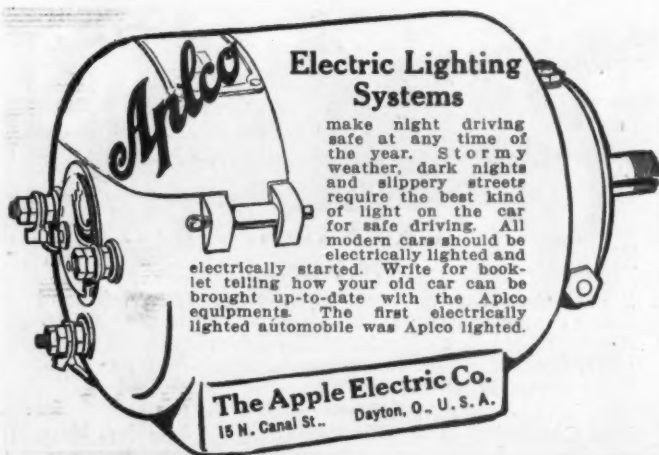
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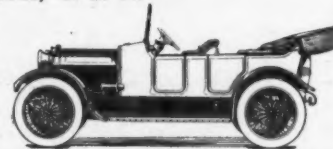
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\$50 Stewart Speedometer
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LEFT-HAND DRIVE
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22½ H. P., 4-cylinder water-cooled motor, Bosch magneto, standard artillery wheels, best quality 30"x3" clincher tires, extension top, wind shield, five lamps, gas generator, tools, etc. Makes 5 to 50 miles per hour on the high speed, 28 to 32 miles on 1 gal. of gasoline. A thoroughly practical, fully guaranteed car. You can secure EXCLUSIVE SALE in your territory.

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Let us also quote on your piston, piston ring, piston pin, motor gear and transmission requirements. We have special facilities for producing this work.

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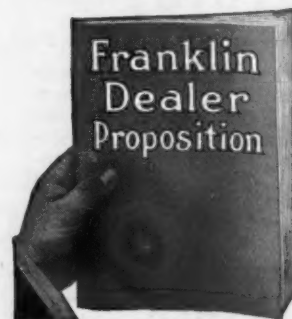
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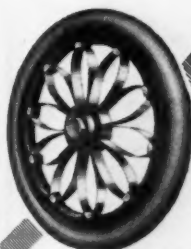
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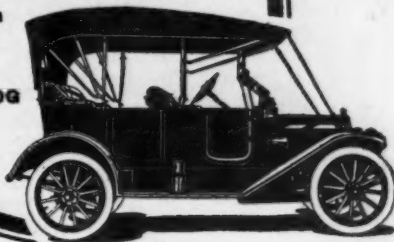
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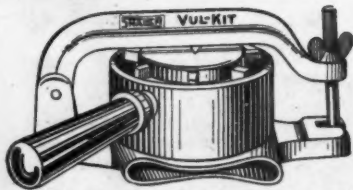
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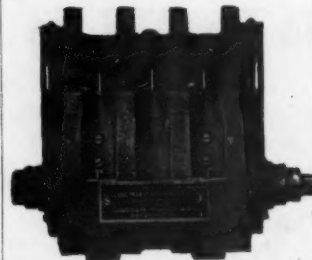
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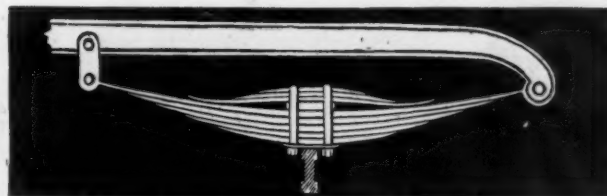
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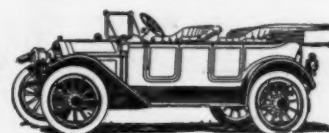
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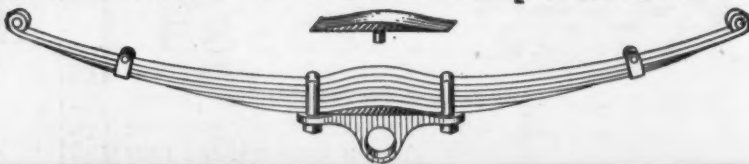
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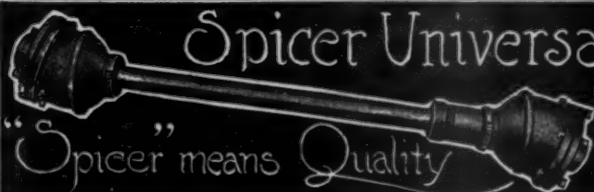
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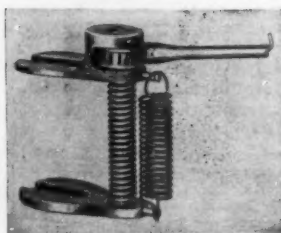


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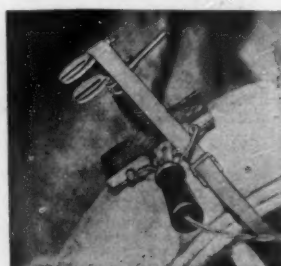




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A VALVE LIFTER—
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Plug
Pump



Watch
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Motor
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the
Work

No exertion, no delay, no dirt, no oil. Your wife can inflate the largest tire in from 2 to 4 minutes—without bending over. Simply remove a spark plug from any convenient cylinder and substitute the pump. Inflates the tire with pure, cool air. Constructed with metal rings like your motor, and will last as long. Weighs but 2½ lbs. Adapted to all size cars from smallest Ford to largest Lozier. Try one free on your car before purchasing. Furnished with adapters to fit any car, 12 feet of hose and connections. Price, \$10.00. With pressure gauge, \$2.00 extra.

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Don't Skid!

—but save the cost of chains by using the modern non-skids for snow and ice

Double Woodward Grip Treads

No bother putting on and off—they stay on all the time.

No banging of loose links.

No chafing—no punctures—no frost-bitten fingers—no delays.

Woodworth Treads protect the tires, and save more than their cost in the added mileage they give. They cost *nothing* in the end.

The Double Grip Woodworths have a special series of high rivets giving perfect traction in snow and ice.

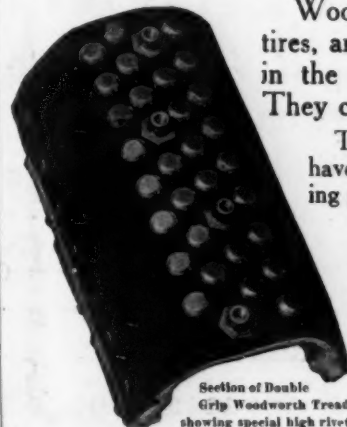
Put them on *now*, while your tires are still good.

Leather Tire Goods Co.

Niagara Falls, N. Y.

Distributors: D. A. Falkenburg & Co., 1210 Webster Ave. Chicago, Ill.

Good Agents Wanted for Unoccupied Territory



Section of Double Grip Woodward Treads showing special high rivets

THE INCOMPARABLE WHITE THIRTY



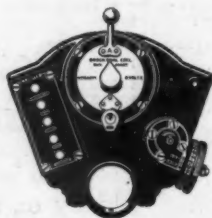
Electrically started and lighted left side drive right hand control

The **WHITE THIRTY** is the pioneer car. It revolutionized gasoline motor construction in America by introducing the long stroke monobloc principles of motor design.

Economy in fuel consumption was a myth until the advent of the **WHITE THIRTY** which has proved by repeated tests to be more economical than any other car of equal size and power.

Left side drive with the only logical method of control—that of right hand operation of the gear lever, combined with the White electrical starting and lighting system—with two years of successful operation, makes the **WHITE THIRTY** in addition to the most economical, the most desirable and convenient medium sized car.

THE WHITE COMPANY
Cleveland



Packard Control Board

Answered by the Packard "38"

Why is a Packard at its best after thousands of miles of hard usage on the road?

Why will a Packard run so long without mechanical attention?

Why can a Packard run 30,000 miles without overhauling?

Why may a Packard owner start on a thousand-mile tour at a moment's notice?

Why will a Packard bought this spring have a higher relative cash value next fall, next spring or five years hence than any other car purchased at the same time?

Why does the discriminating buyer demand a Packard?

Ask the man who owns one

Here are some of the "38" features looking to safety, convenience and Maximum Service :

Left Drive	Short Turning Radius
Electric Self Starter	Six Cylinders Perfected
Electric Lighting	Dry Plate Clutch
Centralized Control	Forced Feed Oiling
Separate Magneto Ignition	Extra Large Crank Shaft
Hydraulic Governor	Six-inch Depth of Frame
The Bridge Builder's Factor of Safety	

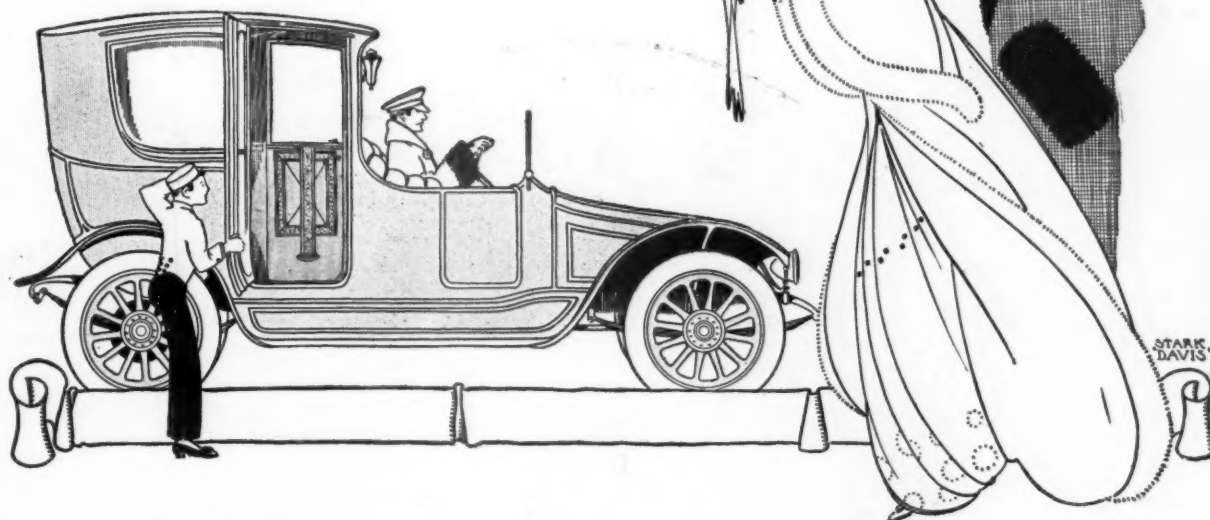
The sum of these essentials is to be found in no other car. This comprehensive solution in one motor carriage of all the chief problems of recent years compels the consideration of the critical patron.

*Demonstration by any Packard
dealer on any kind of road*

Packard Motor Car Company, Detroit

THE BORLAND ELECTRIC LIMOUSINE
The Motor Car of the Future.

WHEEL base, 123 inches. Speed, 25 miles an hour. Capacity, 125 miles per charge. Combining all the silence, cleanliness, ease of control and known dependability of the rightly built electric car with the high efficiency heretofore associated only with the better quality of gasoline machines. Impartial critics—gas car manufacturers and others—have proclaimed this the most graceful and distinguished exhibit of the season—irrespective of motor power. To keep abreast of automobile progress send for photographs and literature describing this and the seven other new Borland Electrics—the talk of the Chicago Show.



DON'T be a Summer Hotel, Mr. Gas Car Dealer! Don't keep open six months in the year with a twelve months overhead expense! Do a twelve months, all the year 'round business selling

Borland Electrics

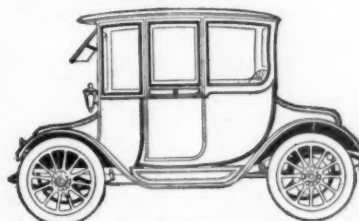
—and bolster up your gas-car sales.

NO different sales organization is required. You need not be an electrician or mechanic to operate, own or sell an electric car. Give the people what they want. Keep your sales booming all the year.

We are about to launch an extensive and original advertising campaign—one addressed directly to your personal customers. New Borland dealers will profit by this without expense to themselves.

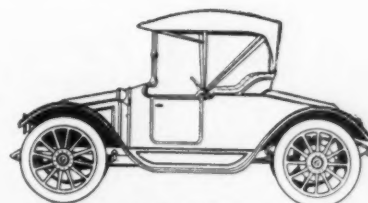
IDENTIFY yourself with a company which is doing away with the obsolete traditions surrounding electric car design.

- A company which is building only the best in every instance.
- A company which avoids sensational and freak "features".
- And a company whose financial backing and business integrity is established beyond all dispute.



COUPE.
Forward or rear drive. Price, twenty-nine hundred dollars.

Factory facilities enable us at this time to offer agency territory to those reputable and well-equipped dealers who are as particular about selling the best, as we are about making it. Write for terms.



ROADSTER.
Speed, 35 miles an hour. Price, twenty-five hundred and fifty dollars.

THE BORLAND-GRANNIS COMPANY

MANUFACTURERS

Executive Offices and Salesrooms, 2634 Michigan Avenue

CHICAGO, ILL

National

STOCK CHAMPION

INTERNATIONAL CHAMPION



500 miles
running
average
81.72
miles per
hour

Superb Power Coupled With Unusual Ease of Control

THERE is a thrill of deep satisfaction in driving a car of unbounded reserve power, and there is no car made which combines this quality with ease of control so perfectly as the NATIONAL.

Five Models Ranging in Price from \$2750 to \$3400. Electric started, electric lighted, left side drive, center control

As you sit at the wheel of the *National* you experience that complete confidence which comes only to the man who feels himself the perfect master of great power. No hill is too steep, no road too heavy, no emergency too sudden—for the *National*.

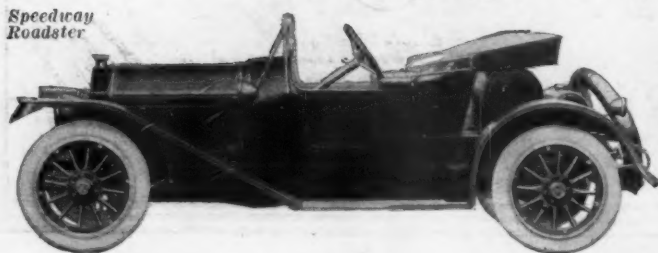
In addition, the *National* represents the highest possible development of luxury in motor car manufacture.

Every little detail which in any way can make for greater comfort has been cared for.

Truly, the *National* is a car of superb power, luxurious comfort and graceful beauty—sold at a remarkably moderate price. We have an intensely interesting book which tells the whole story. It is called “*National 40*,” and is free to you.

NATIONAL MOTOR VEHICLE CO., Indianapolis

Speedway
Roadster



Five Passenger
Touring Car



LEFe 14

